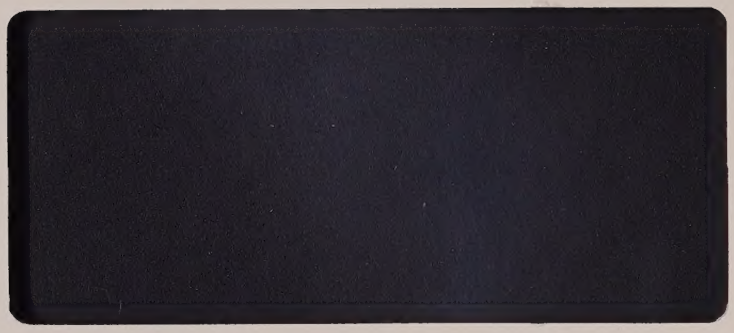
SIGNAL LEVEL METER

MODEL 7272

Texscan
INSTRUMENTS



SIGNAL LEVEL METER

MODEL 7272

TEXSCAN CORPORATION
2446 N. SHADELAND AVENUE
INDIANAPOLIS, INDIANA 46219

317/357-8781

C A U T I O N

THIS UNIT HAS BEEN FACTORY SET FOR 115 V rms 60 Hz OPERATION. IF OPERATION FORM 230 V rms 50 Hz IS DESIRED CONSULT THE MANUAL FOR PROPER SETTING OF THE LINE VOLTAGE SWITCH.

DAMAGE TO ANY UNIT WHICH IS CONNECTED TO A 230-VOLT POWER SOURCE, BUT WHICH IS SET INTERNALLY FOR 115-VOLT OPERATION CONSTITUTES "MISUSE", AND IS NOT COVERED BY THE TEXSCAN WARRANTY. CONSULT THE INSTRUCTION MANUAL FOR THE PROPER INTERNAL POWER-SOURCE SETTING, IF THERE IS ANY QUESTION ABOUT THE INTENDED USE.

NOTE: THE LINE FUSE MUST ALSO BE CHECKED FOR THE CORRECT RATING AND TYPE.

IMPORTANT NOTICE
HANDLE WITH CARE

THIS ELECTRONIC INSTRUMENT WAS DESIGNED FOR NORMAL OPERATING AND STORAGE CONDITIONS ENCOUNTERED IN FIELD USE. IT SHOULD BE HANDLED AND TRANSPORTED WITH CARE TO AVOID DAMAGE TO DELICATE COMPONENTS AND CIRCUITS. PERSONNEL UNFAMILIAR WITH ELECTRONIC INSTRUMENTS SHOULD BE INSTRUCTED TO AVOID DROPPING, THROWING, BOUNCING, STRIKING, OR OTHERWISE MISHANDLING THE UNIT. WHEN TRANSPORTING THE INIT IN A VEHICLE, CARE SHOULD BE TAKEN TO CUSHION IT AGAINST SEVERE SHOCKS THAT MIGHT OCCUR.

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DESCRIPTION AND SPECIFICATIONS

1.1 DESCRIPTION

Model 7272 is a tunable RF voltmeter designed for measuring signal levels between -35 dBmV and +70 dBmV in the frequency range from 5 to 405 MHz.

An accessory plug-in converter is available on special order for extending the operating range into the 470 to 890 MHz UHF band.

The instrument consists essentially of a tuner local oscillator unit, a balanced mixer, an IF amplifier, and a peak detector measuring circuit. A step attenuator in the input circuit permits setting the measurement range. Frequencies can be tuned in six switch-operated ranges.

The 7272 includes a built in volt-ohm meter, a video detector whose output is available at a front panel terminal, a discriminator, an audio amplifier, and a loudspeaker to help in the identification of interfering signal sources. The metered signal current is also available at a rear panel phone jack for application to a strip chart recorder or similar device.

Model 7272 may be powered from a 115V or 230V, 50 Hz or 60 Hz line source, from an external 12 to 15 volt battery, or from its own internal, rechargable, nickel-cadmium battery. Each instrument is accompanied by a calibration chart in the lid; the compensator calibration points are factory-inserted on the chart.

1.2 SPECIFICATIONS

The specifications of Model 7272 are listed in Table 1-1.

TABLE 1-1 SPECIFICATIONS

Frequency Range		5 to 50 MHz, 54 to 405 MHz in 6 bands
Tuning Range	A	5 to 50 MHz
	B	54 to 108 MHz
	C	108 to 162 MHz
	D	162 to 234 MHz
	E	234 to 306 MHz
	F	306 to 405 MHz
Measurement Range		-35 dBmV to +70 dBmV
Accuracy of Level Readings		±1.0 dB (typically ±0.5 dB) at 25°C, ±3 dB (typically ±1.5 dB) from -18°C to +60°C
Video Output Capability		0.8V p-p for +10 dBmV input with compensator control set for no overload
Maximum Sensitivity		-35 dBmV
Selectivity		IF bandwidth of 0.6 MHz at 3 dB points

Rejection of Adjacent Sound Carrier	46 dB down from level of received video carrier
Input Impedance & Match (above 100 microvolts)	75 ohms, VSWR 1.22:1 (20 dB minimum return loss)
Power Requirements	AC line: 115V or 230V, 50-60 Hz (±10%), 0.3A maximum. Internal battery: 12V, 0.6 Ah, External battery: 12-15V, at least 0.6 Ah
Ambient Storage Temperature Range	-40°C to +60°C (-40°F to +140°F)
Ambient Operating Temperature Range	-18°C to +60°C (0°F to +140°F)
Net Weight	15 lbs (6.9 kg)
Dimensions	8-1/2" H x 13-1/4" W x 8-1/4" D (21.3 x 33.1 x 20 cm)
Voltmeter (DC)	0 to 60V DC, 0 to 120V AC, ±5%
Ohmmeter	0 to 2000 ohms, ±5%
Peak Detector	Maximum change between CW and video: 0.5 dB

OPERATION

2.1 OPERATING CONTROLS AND CONNECTIONS

The operating controls and connections of Model 7272 are listed in Table 2-1.

TABLE 2-1 OPERATING CONTROLS AND CONNECTIONS

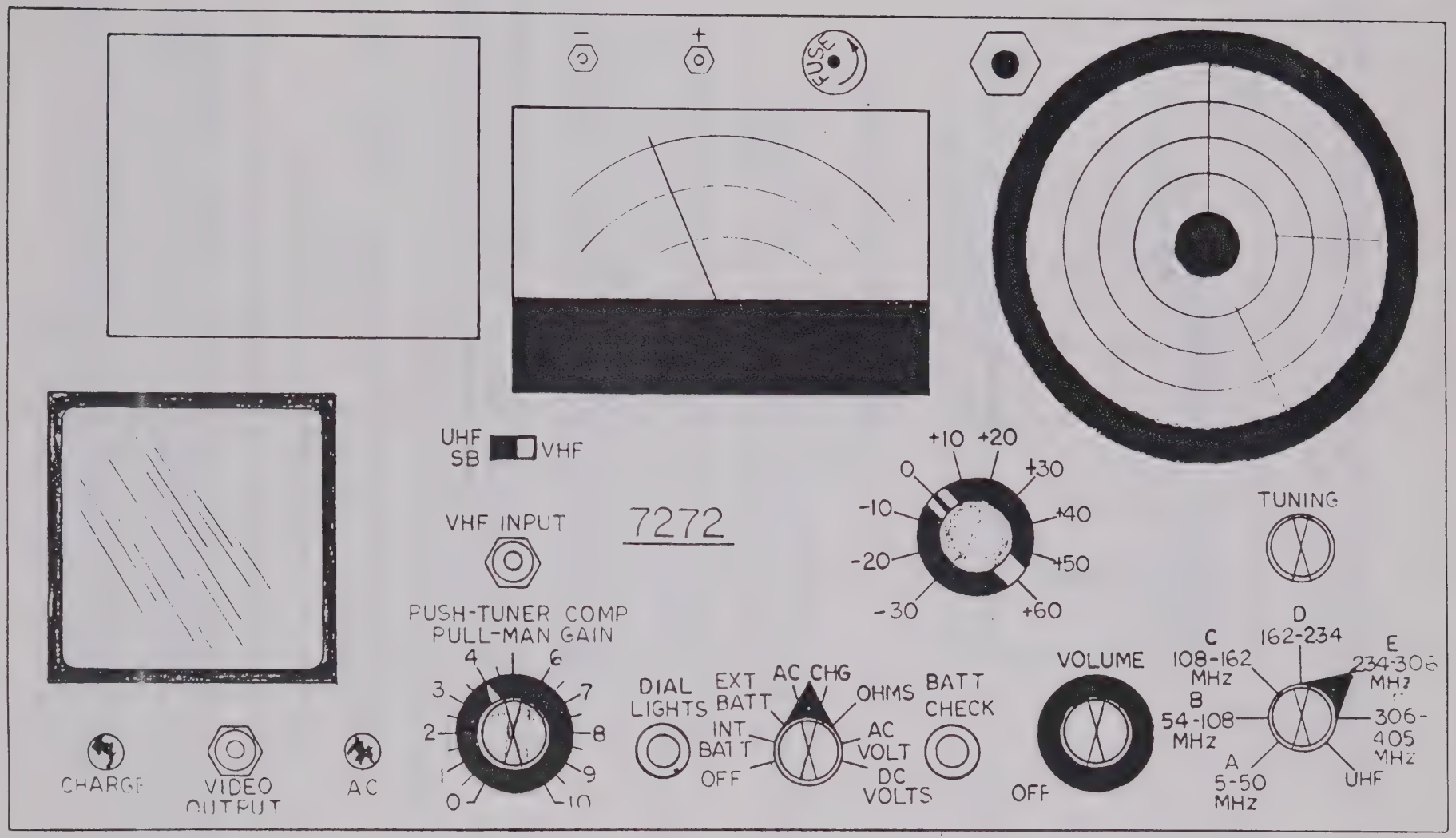
FRONT PANEL

NAME	POSITION	FUNCTION
Charge	-	Indicates unit is operating to charge internal battery
Video Output	-	For connection of an oscilloscope
AC	-	Indicates unit is operating from AC line
PUSH-Tuner Comp	Pushed in 0-10	Permits calibration of unit over its frequency range
PULL- MAN Gain	Pulled out	Provides uncalibrated 27 dB range control for the IF amplifier; the meter readings are relative with the control in this position
Function Selector	OFF	De-energizes the instrument
	INT BATT	Connects internal battery
	EXT BATT	Connects external battery
	CHG	Permits charging internal battery
	OHMS	Permits ohms measurement
	ACV	Permits AC volt measurement
	DCV	Permits DC volt measurement
Dial Lights	-	Controls tuning dial lights and meter lights
UHF/VHF	UHF	Connects the UHF converter output for measurement
	VHF	Connects the VHF input for measurement
VHF Input	-	For connecting VHF signal source
Meter Range	Set for on scale reading	Indicates meter sensitivity
Meter	-5 to +10 dB scale	Indicates dB levels
	0 to ∞ ohm scale	Indicates ohm value
	0 to 120 VAC scale	Indicates AC voltage level
	0 to 60 VDC scale	Indicates DC voltage level
Fuse	-	Volt-ohm meter fuse

NAME	POSITION	FUNCTION
Tip Jack	-	Volt-ohm test lead jack
Tuning	A,B,C,D,E & F Scales	Indicates tuning ranges; color bands indicate ranges between video and sound carrier of each VHF TV channel
Batt Check	Depressed	Permits charge of internal battery, and output voltage to internal power supply when unit is connected to AC line
Volume	OFF	De-engerizes audio amplifier
	-	Controls audio volume
Frequency Range Selector	A/5-50 MHz	Selects 5-50 MHz range
	B/54-108 MHz	Selects 54-108 MHz range
	C/108-162 MHz	Selects 108-162 MHz range
	D/162-234 MHz	Selects 162-234 MHz range
	E/234-306 MHz	Selects 234-306 MHz range
	F/306-405 MHz	Selects 306-405 MHz range
	UHF	Selects operation with UHF adapter
REAR PANEL		
Recorder	-	Permits connection of a recording device
Fuse	-	Protects instrument against surge currents
-(blk)EXT +(red)BATT	-	Permits connection of instrument to external battery
115/230 VAC 50/60	-	Accepts female plug of line cord
INTERNAL		
Power Selector	115	Permits operating unit from 115V AC line
	230	Permits operating unit from 230V AC line

2.2 SETTING THE MEASUREMENT RANGE

Table 2-2 lists all the measurement ranges obtainable from settings of the meter range switch.



7272 FRONT PANEL DIAGRAM

Each measurement range can be identified simply by observing the setting of the METER RANGE switch. The METER RANGE indicates the signal level for a 0 (zero) reading on the dB scale.

METER RANGE SETTING	MEASUREMENT RANGE	
	dBmV	dBmV
-30	-35	-20
-20	-25	-10
-10	-15	0
0	- 5	+10
+10	+ 5	+20
+20	+15	+30
+30	+25	+40
+40	+35	+50
+50	+45	+60
+60	+55	+70

TABLE 2-2 MEASUREMENT RANGES

2.3 MEASURING VHF SIGNAL LEVELS

1. Set the function switch according to the power source to be used.

2. If AC line source is to be used, remove the line cord from its compartment at the rear of the instrument and connect the cord there to the recessed 3-prong jack.

3. If an external battery is to be used, connect the battery leads to the red (positive) and black (negative) tip jacks at the rear of the instrument. Take care in observing polarity and heed the caution on the label.

4. When using an internal or external battery, press the BATT CHECK switch to see that the meter needle points to the red BATT mark on the meter scale. This check will also indicate the correctness of the internal power supply output voltage when the instrument is operated from the AC line.

5. Connect the VHF signal source to the VHF INPUT terminal on the front panel.

6. Set the UHF/VHF switch to VHF.

7. Set the tuning range selector switch as required.

8. Push in the compensator control and turn it to the setting indicated on the calibrated chart in the lid of the 7272 for the frequency nearest that of the signal under test.

9. Tune the 7272 back and forth past the signal frequency, adjusting the meter range until the meter indicates between 0 and +10 on the dB scale when the 7272 is tuned for maximum reading (this condition will not be attainable for readings below -30 dBmV).

10. Observe the METER RANGE switch and note the measurement range indicated.

11. Read the signal level.

12. Add the meter range setting to the meter reading to obtain the signal in dBmV.

2.4 RESISTANCE MEASUREMENT

1. Set the function switch to ohms.

2. Connect the red and black test leads to the tip jacks located above the meter.

3. Connect the test leads to the item to be measured.

4. Read the resistance in ohms from the ohms scale.

2.5 AC VOLTAGE MEASUREMENT

1. Set the function switch to AC volts.

2. Connect the red and black test leads to the tip jacks located above the meter.

3. Connect the test leads to the voltage to be measured.

NOTE: Highest accuracy is always obtained when using the 0 to +10 portion of the dB scale.

4. Read the AC voltage reading from the AC volt scale.

2.6 DC VOLTAGE MEASUREMENT

1. Set the function switch to DC volts.

2. Connect the red and black test leads to the tip jacks located above the meter.

3. Connect the test leads to the voltage to be measured.

4. Read the DC voltage from the DC volt scale.

2.7 OPERATING FROM A 230V AC LINE

The meter is shipped from the factory with the Power Selector switch set to 115. To operate the unit from a 230V line, first remove the chassis from the cabinet by removing the four binding-head screws at the rear of the cabinet and pulling the chassis out from the front. Then set the switch, located at the rear of the chassis near the lower right corner, to the 230V position. Return the chassis to the cabinet.

2.8 RECHARGING THE INTERNAL BATTERY

The 7272 is equipped with a rechargeable nickel-cadmium battery. Because the state of charge of the battery when the instrument is received by the customer cannot be known, the battery must be charged for 14 to 24 hours before the instrument is operated on battery power.

When a nickel-cadmium battery with series connected cells, such as the one used in the 7272 is discharged too deeply, the weak cells are reverse-charged by the stronger ones. If recharging of the battery is attempted under this condition, the reverse-charged cells will be damaged by the charging current. For this reason, it is essential that the battery not be allowed to discharge too deeply.

Texscan recommends that for cases where the meter is operated only occasionally on battery power, a 14 to 24 hour charge be given every two weeks. Where the unit is battery-operated frequently, it should be left on charge every night.

The battery is charged as follows:

1. Use the line cord to connect the instrument to an AC source.

2. Open lid. The lid must remain open during the charging period; when the lid is closed, an interlock switch disconnects the battery.

3. Set the power selector switch to CHG.

4. The initial charge should extend over a period of from 15 to 20 hours. Since the charging current flows through the CHARGE lamp, the lamp will glow brightly at first and grow dimmer gradually as the battery approaches full charge. If the lamp does not light the battery is not charging.

5. After this initial charge, follow the procedure outlined on the line cord compartment lid, remembering to keep the front lid open during the charging period.

3.1 GENERAL

Model 7272 has applications where measurements of relative or absolute RF signal levels are to be made. In addition, the video detector in the unit allows application in the measurement of a detected signal on a calibrated oscilloscope. This section of the manual describes how to use the instrument for various kinds of RF measurements.

3.2 FIELD INTENSITY SURVEYS

Model 7272 can be used together with a 75-ohm resonant dipole (Texscan Model AFS-1) for plotting detailed field intensity contour maps necessary for choosing antenna sites for CATV systems. For these measurements the 7272 and the antenna are moved about on an area map. These readings are then converted to field strength indications using the following equation:

$E = 0.021\ fV$ Where: E = the field strength in $\mu V/M$ (microvolts per meter)
f = frequency in MHz
V = signal strength in μV or

$$10\ \left[\frac{dBmV + 30}{20}\right]$$

Table 3-1 is the result of using this equation to obtain conversion factors (C) for the video carrier frequency of every VHF television channel. Using these factors, the above equation reduces to: $E = CV$

If an antenna other than a resonant dipole is used for making the measurement, the gain factor (G) of the antenna must be taken into account (for example, for an antenna with 20 dB of gain, the gain factor $G = 10$) and the equation becomes:

$$E = \frac{0.021}{G}\ fV \text{ and } E = \frac{CV}{G}$$

CHANNEL	C	CHANNEL	C
2	1.20	8	3.84
3	1.32	9	3.97
4	1.45	10	4.10
5	1.66	11	4.22
6	1.79	12	4.35
7	3.72	13	4.47

TABLE 3-1 CONVERSION FACTORS FOR FIELD INTENSITY SURVEYS

3.3 ORIENTING ANTENNAS

Model 7272 can be employed for orienting antennas for best reception. The antenna down lead is connected to the VHF INPUT terminal (if necessary, through a matching transformer) and the antenna is then oriented for maximum reading of the video carrier signal on the 7272.

For the case of a single-channel antenna, the 7272 is tuned to the video carrier of the channel and the antenna is oriented according to the reading of the 7272.

For the case of broadband antennas, the 7272 reading is maximized for the video carrier of each channel to be received, noting the reading and orientation for each channel. A compromise orientation is then selected on the basis of these readings and orientations. Readings are repeated for each channel with the antenna in the compromise orientation to assure that adequate signal strength is available for each channel. The procedure for FM antennas is the same as that for broadband antennas.

3.4 MEASUREMENT OF GAIN AND LOSS

For measuring gain and loss of a circuit at specific frequencies proceed as follows:

1. Set up the equipment as shown in Figure 3-1.

2. Tune the 7272 and the signal generator to the test frequency.

3. Measure and record the signal level at the input to the circuit under test.

4. Measure and record the signal level at the output of the circuit under test.

5. The gain or loss is the difference between the two readings obtained. For example, if the input signal level is 5 dBmV and the output signal is 1 dBmV, the circuit has a loss of 4 dB. If the output level is 40 dBmV for an input level of 5 dBmV, the circuit has a gain of 35 dB.

6. Readings are obtained at a number of points across the passband of the circuit and the results are plotted to obtain an approximation of the response curve.

3.5 MEASUREMENT OF NOISE LEVELS

Although the 7272 meter scale is not calibrated for noise level readings, with proper correction of readings taken the instrument can be used for measuring noise levels in CATV systems. The corrections are necessary for two reasons: First, since noise levels in CATV systems are usually specified for a bandwidth of 4 MHz while the IF bandwidth of the 7272 is only 0.6 MHz, the meter readings would be about 8 dB low (noise power is proportional to bandwidth, hence a power ratio of 4:0.6 equals 6.7 which corresponds to 8.2 dB).

The second error source, having an effect opposite to that above, is the response to noise of the peak detector in the 7272. Since the detector is designed to respond to the peak of the television picture signal, the instru-

ment indicates peak noise rather than rms noise. As noise has a higher peak-to rms ratio than a CW signal, the detector output reads high, reducing the correction required.

With these considerations in mind, noise calibration tests were made on a number of Model 7272's chosen at random. The resulting correction curves are shown in Figure 3-2. The curves indicate the maximum and minimum corrections found necessary for the tested units and the resultant average curve. The latter is sufficient for corrections of noise level measurements where an accuracy of plus or minus 1.0 dB is acceptable. For greated accuracy, the individual instrument would have to be calibrated from an accurately known noise source (section 3.6).

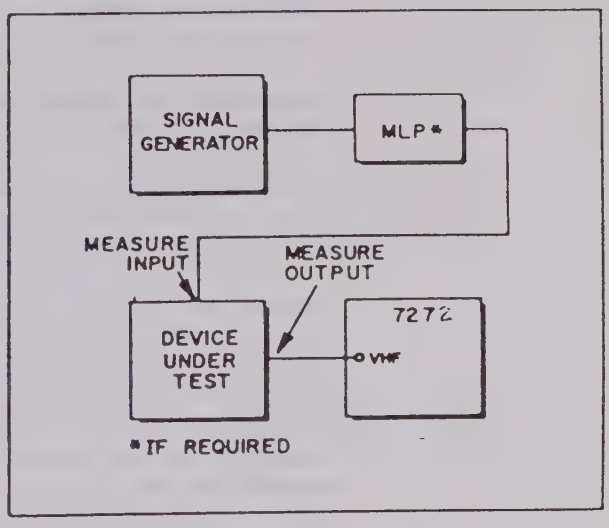
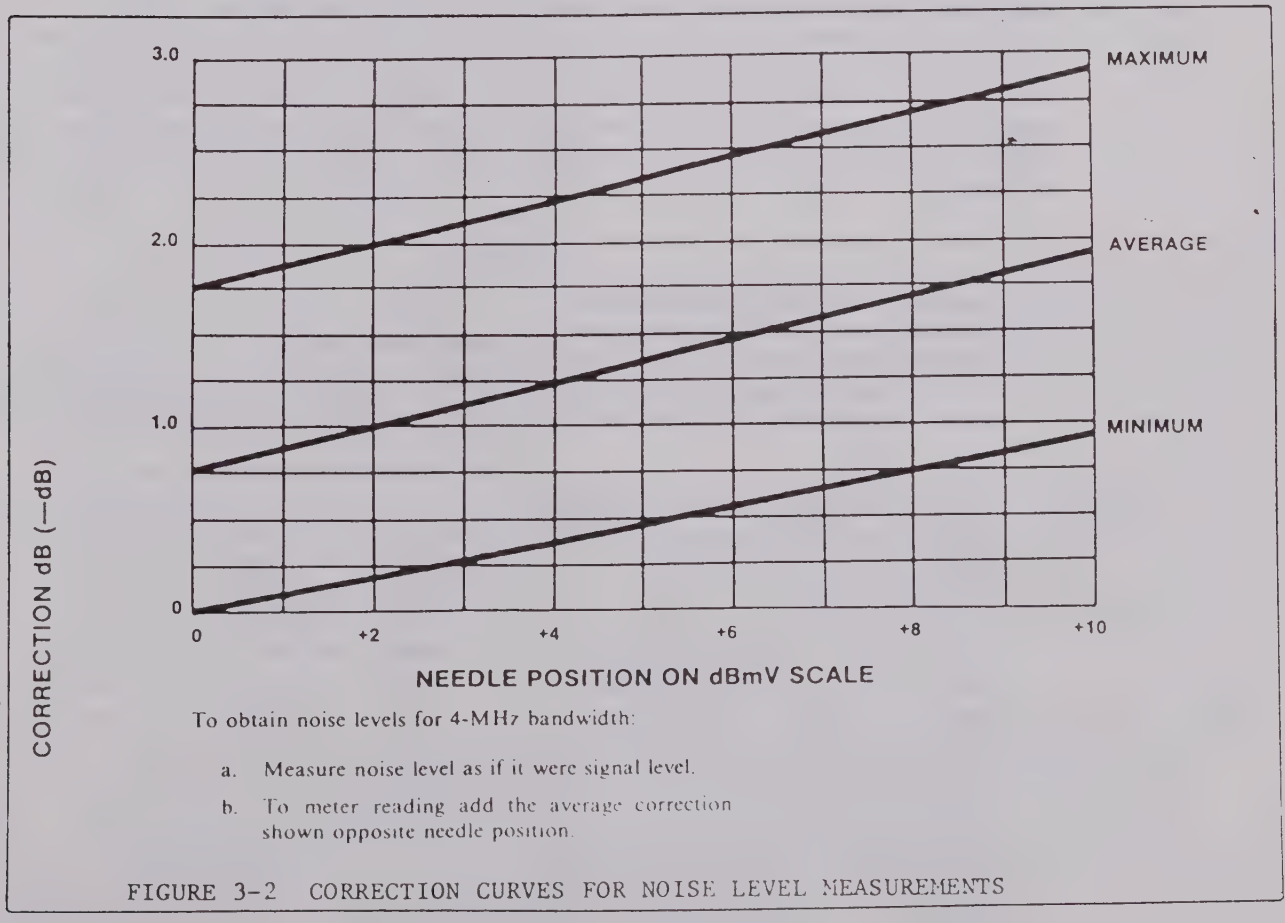


FIGURE 3-1 SETUP FOR GAIN AND LOSS MEASUREMENTS



To obtain noise levels for 4-MHz bandwidth:

a. Measure noise level as if it were signal level.

b. To meter reading add the average correction shown opposite needle position.

FIGURE 3-2 CORRECTION CURVES FOR NOISE LEVEL MEASUREMENTS

For using the average curve in determining, for example, the S/N ratio in a trunk line, proceed as follows:

1. Connect the output of the last trunk line amplifier to the VHF INPUT terminal on the 7272.

2. Disconnect the head-end output from the input to the first amplifier in the trunk line; but do not disconnect the standby carrier signal, which is needed for normal AGC operation.

3. Tune the 7272 to the highest and the lowest channel carried on the system and record the meter readings as if a signal were measured.

4. Obtain the correct noise level for both channels by adding the corrections taken from the average curve; or for greater accuracy, from the noise calibration record of the particular Model 7272.

5. Subtract the corrected noise levels from the signal levels of both channels at the output of the last amplifier to obtain the S/N ratio at that point.

3.6 NOISE CALIBRATION OF A MODEL 7272

This section describes a convenient method of calibrating a 7272 by using an amplifier whose noise figure is accuractly known. Figure 3-3 shows the equipment setup. The input to the amplifier with known noise figure is terminated accurately in 75 ohms and its output is connected through a variable attenuator to the input of a second amplifier. The output of the latter is then connected to the VHF INPUT terminal of the field strength meter.

Calibration is done as follows:

1. Tune the 7272 to a convenient channel having no local signal. Set the 7272 meter range switch to -20 dBmV, then adjust the tuner compensator to the calibrated point.

2. Adjust the variable attenuator for full-scale reading on the meter.

3. Now measure the gain from the input to the first amplifier to the output of the second amplifier, then measure the noise figure at the input of the first amplifier. If the net gain from the input of the first amplifier to the input of the second amplifier is over 15 dB, it is safe to assume that the noise figure of the combination is the same as that of the first amplifier.

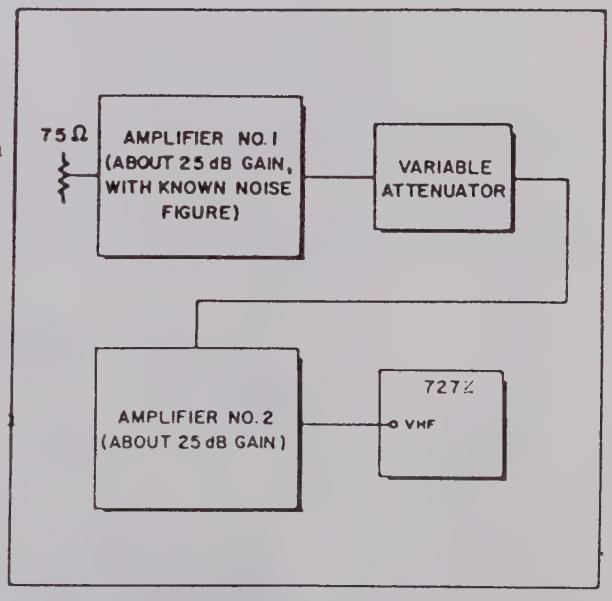


FIGURE 3-3 SETUP FOR NOISE CALIBRATION OF A 7272

4. As the minimum noise level in any 75-ohm system is - 59.2 dBmV, the noise output of the combination into the field strength meter is: - 59.2 + N.F.+ Gain. If for example, the noise figure measured were 8.4 dB and the net gain combination would be : - 59.2 + 8.4 + 44.5 = -6.3 dBmV.

5. The correction for the 7272 at full scale is the number of dB that must be added to the reading to equal this calculated noise level. In our example: - 6.3 =-10 + X, and X = 10 - 6.3 = 3.7 dB.

6. Find the corrections required at other points of the scale by adding attenuation in 1 dB steps, noting after each step how far below the dB marks the meter needle reads.

3.7 MEASUREMENT OF PERCENT CROSS-MODULATION

Model 7272 can be employed in a simple test setup for making reasonably accurate percent cross-modulation measurements in the field, using the signals available in a TV distribution system. While the method described here is sensitive enough for measurements in an operating distribution amplifier, it is not sensitive enough for measurements in individual trunk line amplifiers operating at their normal system levels.

Figure 3-4 shows the equipment set-up. The required signals are obtained from the system or directly from the head-end converters (for example from Channel Commanders). The CW signal is obtained from a CW generator or from the standby carrier condition of the converter concerned.

To obtain meaningful results, modulation on all channels other than the one under test should be synchronous. Where tunable converters are used, this can be accomplished by tuning them all to receive the same channel.

The high-pass filter in the set-up passes any cross-modulation components (around 15 KHz) but blocks hum components (around 60 Hz) so that the latter will not obscure the measurement of cross-modulation. Operating the 7272 battery power will eliminate one possible source of hum contribution.

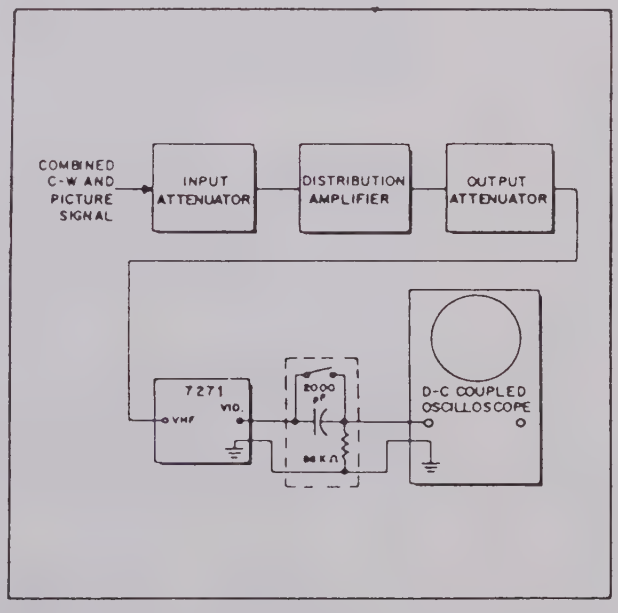


FIGURE 3-4 SETUP FOR PERCENT CROSS-MODULATION MEASUREMENTS

Measurement is done as follows:

1. Introduce the CW signal on one channel, and interfering signals on other channels as required, through the input attenuator to the input terminal of the distribution amplifier, or the first trunk line amplifier of the system under test.

2. Connect the 7272 through a second attenuator to the output of the distribution amplifier or the last trunk line amplifier of the system; set the channel levels and in input attenuator to give rated output on each channel; note the meter reading.

3. Tune the 7272 to the CW signal frequency. Reduce the attenuation in the output attenuator by 20 dB and set the 7272 manual gain control to obtain the same meter readings as in Step 2.

4. Close the filter bridging switch. Set the oscilloscope for operation in the DC mode and in the 0.1V/cm vertical sensitivity range. Position the reference trace on the bottom line of the oscilloscope screen and increase the input to the 7272 by reducing attenuation in the output attenuator until reference signal and CW signal differ by 0.8V; the 7272 manual gain control can be used for fine adjustment.

5. Switch the oscilloscope to the next higher sensitivity range and adjust the oscilloscope gain until the CW trace is 10 divisions above the reference trace; each division now represents 10% cross-modulation.

6. Open the filter bridging switch and change the oscilloscope to AC operation increase the vertical sensitivity 10 times; one division on the screen now represents 1% cross-modulation. The CW trace can now be observed for exhibiting any modulation due to the presence of other channels in the system.

With one interfering channel, or when all interfering channels have a common sync source, the indicated cross-modulation will vary somewhat with the degree of white in the interfering picture signal. Exact percentage of cross-modulation is therefore determined by observing the oscilloscope until a maximum of cross-modulation is seen; this will occur when there is maximum variation in the interfering signal.

When the interfering signals derive their sync from various sources, their horizontal line frequencies will differ slightly so that relative timing of the various horizontal sync pulses will change constantly. In this case, maximum cross-modulation will occur when a number of sync pulses coincide; it will be necessary to observe the oscilloscope for a longer period to see this happen and to arrive at a reasonably exact percent cross-modulation corresponding to this condition.

To be sure that there is no cross-modulation in the 7272 circuits or in the mixing networks in which the various input signals are combined, it is advisable to test for cross-modulation first without the amplifier or system in the circuit. Adjust for equal levels at the 7272 input, tune to the CW signal and then measure for cross-modulation as above.

NOTE: The video output of the 7272 is specified at 0.8V p-p with no overload. When using an oscilloscope with a sensitivity of 1 mV/cm, the gain can generally be increased up to 25 times for a maximum sensitivity of 0.4% cross-mosulation per division.

When picture signals are not availalbe, the signals from the laboratory signal generators with sine-wave modulation can be used for measuring cross-modulation. Because of the different form of modulation, corrections must be made if the results of this measurement method are to agree with

those obtained using television signals.

Table 3-2 lists the corrections to be applied and Figure 3-5 diagrams the test set-up.

TABLE 3-2. CORRECTIONS FOR CROSS-MODULATION MEASUREMENTS

On Interfering Signal		To Obtain Cross-Mod. Corresponding to TV Signal Modulation:	
% Modulation (for symmetrical Mod.)	Modulation Ratio $\frac{E\ min}{E\ max}$	Multiply Indicated % Cross-Mod. by	or Add dB to Indicated Cross-Mod.
10	0.818	2.97	9.5
20	0.666	1.77	4.9
30	0.538	1.39	2.9
40	0.429	1.21	1.7
50	0.333	1.11	0.9
60	0.250	1.06	0.5
70	0.177	1.02	0.2
77.8**	0.125	1.00	0.0
80	0.111	1.00	0.0
90	0.053	0.99	—0.1
100	0.000	0.99	—0.1

* The derivation of the correction figures is explained in TECHNICAL HANDBOOK FOR CATV SYSTEMS by Ken Simons.
** Corresponding to full modulation of a TV signal.

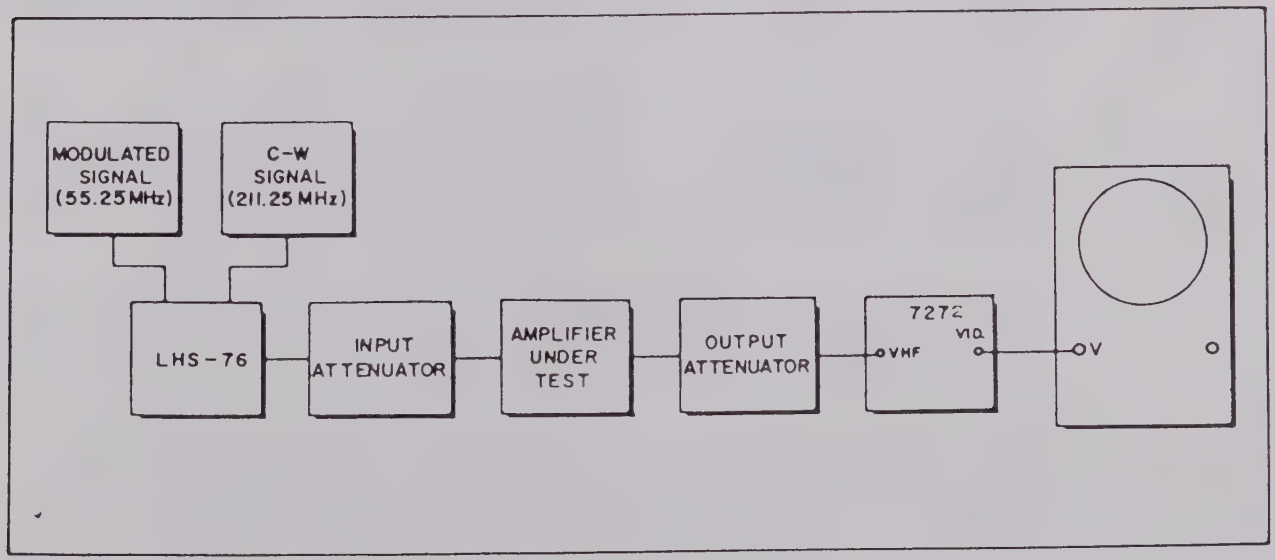


Fig. 3-5. Setup for Cross-Modulation Measurements When Using Signal Generators With Sinewave Modulation

1. Tune one signal generator to the picture carrier of channel 2 (55.25 MHz), the other to that of channel 13 (211.25 MHz).

2. Combine the outputs of the two generators in a Jerrold Model LHS-76 high-band/low-band mixer to prevent cross-modulation between the two bands.

3. Apply the LHS-76 output to the input of a variable attenuator, the output of this attenuator to the input of the amplifier under test, the output of the amplifier to the input of a second variable attenuator and the output of this attenuator to the VHF INPUT terminal on the 7272; finally the VIDEO OUT terminal of the 7272 is connected to the vertical input of the oscilloscope.

4. Preferably use the 7272 on internal battery power to avoid hum pick-up. If the instrument has to be used on AC power, use a 2-pin adapter on the 7272 line cord plug.

5. Set the oscilloscope to operate in the DC mode.

6. Apply a modulation of 1 KHz to the 55.25 MHz signal, then set the input attenuator for 10 dB and the output attenuator for 20 dB.

7. Adjust the generator outputs for rated output levels of the amplifier at both frequencies, taking into consideration the attenuation in the output attenuator.

8. Disconnect the oscilloscope vertical sensitivity and centering controls so that 0 signal reference is on the bottom line of the screen.

9. Reconnect the oscilloscope input signal and tune the 7272 to the modulated signal (55.25 MHz); then adjust the oscilloscope vertical gain control so that the top of signal trace is at the top of the screen (an oscilloscope with a 10 cm grid is assumed).

10. Select a convenient percent modulation figure from Table 3-2; e.g. 30%. Adjust the modulation control on the 55.25 MHz generator so that the bottom of the signal trace is 5.4 divisions (for 30% modulation) above the reference trace, while keeping the top of the signal at the 10th division by adjusting the oscilloscope vertical gain control.

11. Maintain the general output levels as in Step 7 while adjusting the modulation control on the 55.25 MHz generator. Then reduce the meter range by 20 dB, pull the 7272 TUNER COMP/MAN GAIN control to the MAN GAIN position and set it for the same meter reading as in Step 7.

12. Set the oscilloscope vertical sensitivity to the calibrated 0.1V/cm range, remove the oscilloscope input signal and reset the vertical centering to the place the 0 signal reference on the bottom line of the screen. Then reconnect the oscilloscope input signal.

13. Remove attenuation from the output attenuator until the 7272 video output reads 0.8V on the oscilloscope; fine adjustment can be made with the 7272 MAN GAIN control.

14. Switch the oscilloscope to the next higher gain range and check for modulation as in Step 10. If the modulation is not the same as in Step

10. push the 7272 TUNER COMP/MAN GAIN control to the TUNER COMP position and repeat the procedure from Step 7 onwards.

15. With the 7272 video output at 0.8V peak modulation level, adjust the oscilloscope vertical sensitivity so that the top of the signal trace is on the 10th division of the screen; each major screen division now represents 10% apparent cross-mosulation.

16. Switch the oscilloscope to operate in the AC mode and increase vertical sensitivity 10 times; each major screen division now represents 1% apparent cross-modulation.

17. Tune the 7272 to the CW signal frequency (211.25 MHz); since the 7272 meter will now read off scale, tune for maximum deflection of the oscilloscope display.

18. Obtain true percent cross-modulation by multiplying the measured apparent cross-modulation by the correction factor for the percent modulation of the interfering (modulated) signal. Hence, for our example true percent cross-modulation is 0.8% x 1.39 = 1.1%.

3.8 MEASUREMENT OF HUM MODULATION

Since most RF amplifiers are powered with 60 Hz AC, the possibility exists that power supply ripple will modulate the signal passing through the amplifier. To measure this type of modulation with the 7272 proceed as follows:

1. Connect the equipment as diagrammed in Figure 3-6. Use a General Radio Type 274-MB twin banana plug at the vertical input of the oscilloscope and insert a 20,000 pf capacitor between the input and the oscilloscope chassis ground for filtering out noise. Also, to minimize stray hum loops, be certain that there is no ground connection to the oscilloscope chassis other than the input cable shield. If the oscilloscope has a 3-pin plug on its cord, attach a 2-pin adapter. Operate the 7272 on battery power, eliminating the possibility of the meter itself contributing hum.

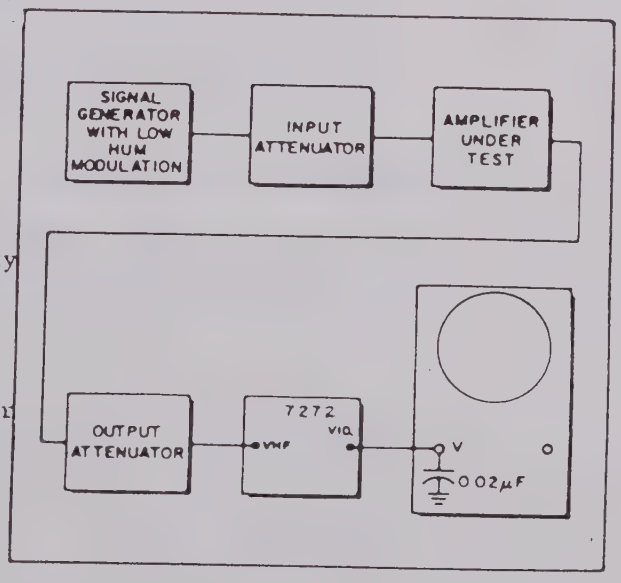


Fig. 3-6. Setup for Measuring Hum Modulation

2. Sync the oscilloscope to the line frequency, then tune the generator and the 7272 to a convenient frequency; the center of the amplifier pass band is a good choice.

3. Set the oscilloscope to DC coupling and the 0.1V/cm range. Adjust the input to the amplifier or system under test so that the output is at normal operating level, keeping the 7272 meter range at 20 dBmV minimum.

4. Remove 20 dB from the output attenuator then pull the TUNER COMP/MAN GAIN control to the MAN GAIN position and set it for the same meter readings as in Step 3.

5. Remove the oscilloscope input signal and adjust vertical centering so that the 0 signal trace is displayed on the bottom line of the screen.

6. Reconnect the oscilloscope input signal and remove attenuation from the output attenuator until the trace of the mofulated signal is 8 divisions above the reference trace; indicating 0.8V (assuming a 10 cm grid on the screen); fine adjustment can be made with the 7272 MAN GAIN control. If appreciable modulation is present, center the trace on the 8th grid line.

7. Switch the oscilloscope vertical sensitivity to the next higher range and remove the oscilloscope input signal. Then adjust vertical centering to reset the 0 signal trace on the bottom line of the screen.

8. Reconnect the oscilloscope input signal and adjust the oscilloscope gain until the modulated signal trace is centered on the 10th grid line. Then set the oscilloscope for AC coupling and center the trace for convenient measurement of the peak-to-peak amplitude. Each major division on the screen now represents 5% modulation (or 26 dB down from a 100% modulated signal). Since a 5% modulated signal has a 5% excursion in both directions from its zero modulation level.

9. For example, if the peak-to-peak amplitude of the trace covers 1.5 major screen divisions, the hum modulation is 1.5 x 5% = 7.5% (or 22.5 dB down from a 100% modulated signal).

10. If the modulation is less than 5%, increase the oscilloscope vertical sensitivity 10 times; each major division on the screen now represents 0.5% modulation (or 46 dB down from a 100% modulated signal). By a further sensitivity increase of 5 times, modulation as low as 0.1% can be displayed on the screen.

3.9 MEASUREMENT OF SYNC CLIPPING

The normal sync signal accounts for approximately 25% of the total amplitude of a composite television video signal. Determining whether or not an amplifier is clipping the sync signal can be done with the 7272 as follows:

1. Connect the equipment as diagrammed in Figure 3-7.

2. Tune the 7272 to the video carrier of a TV cahnnel and adjust the amplifier or system for normal operational output.

3. Set the oscilloscope for DC coupling and vertical sensitivity to calibrated 0.1V/cm.

4. Increase the input to the 7272 by removing attenuation from the input attenuator and by fine adjustment of the 7272 MAN GAIN control until the meter reads the same as in Step 2.

5. Increase the signal input to the 7272 by adjusting the input attenuator until the sync pulse tips are 8 divisions above the reference trace, corresponding to 0.8V.

6. Set 2.5 dB in the input attenuator and note the position of the sync tip on the screen; it represents 25% amplitude.

7. Set the input attenuator to 0 dB and observe the position of the sync pedestal back porch on the screen. If the back porch falls appreciably above the line noted in Step 6, the signal is being compressed.

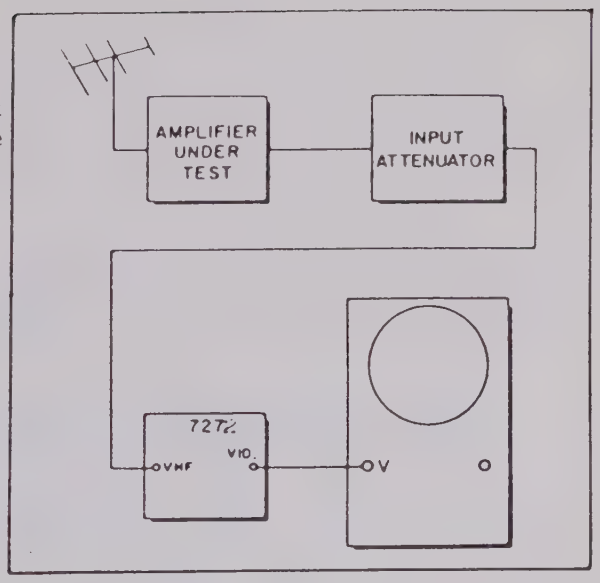


Fig. 3-7 Setup for Measuring Sync Clipping

CIRCUIT DESCRIPTIONS

4.1 GENERAL

The signal to be measured is applied to the front panel VHF INPUT terminal. With the UHF/VHF switch in the VHF position, the signal passes through the switch contacts to a multi-step attenuator which serves to adjust the measurement range of the unit (Figure 4-1).

From the attenuator the signal passes through one of the four bandpass filters, selected by the frequency range selector switch. The signal is then applied to a balanced mixer circuit where it beats with the signal from one of the tuner oscillators to give the IF signal. The tuner assembly consists of six oscillators, one for each tuning range. The appropriate oscillator is energized through the frequency range selector switch.

The mixer output is applied through contacts of the frequency range selector switch to the IF amplifier. The input and the output of the first amplifier stage are sharply tuned with 52 MHz coaxial resonator bandpass filters. The signal is passed through two additional amplification stages and, then takes two paths.

Part of the signal is amplified, detected, and then fed to the front panel VIDEO OUTPUT terminal. The other portion of the signal is detected by a phase discriminator and then amplified to drive a small panel-mounted speaker. AM as well as FM signals pass through the discriminator so that sync buzz and intelligible AM transmissions can be heard.

The signal at the input of the discriminator is also fed to a peak detector circuit. The detector signal drives the 7272 meter and is brought out to a rear panel phone jack for application to a recording device if desired. The COMP control in the IF amplifier calibrates the unit across its frequency range, when in the pushed-in position, and acts as a manual gain control for sync compression and hum measurements when in the pulled-out position.

The 7272 may be powered from its own rechargeable 12V battery, from an external 12-15V battery, or from a 115V or 230V AC line. The power source is selected with a front panel switch which also provides for recharging the internal battery at a 10% rate from the 115V or 230V line; the battery is trickle-charged while the unit is operating from the line.

4.2 METER RANGE ATTENUATOR

The VHF input signal is applied through the VHF INPUT terminal J101 and the UHF/VHF switch S101 to the attenuator. The attenuator consists of 0 through 90 dB pads switched into or out of the signal path, thus giving the attenuator a range of 0-90 dB in 10 dB steps. The attenuator settings determine the level of the signal applied to the measuring circuit and thus the measurement range of the unit. The measurement range is indicated by the position of the METER RANGE switch.

The signal from the attenuator is applied through contacts of the frequency range selector switch S701 to one of six bandpass filters.

4.3 BANDPASS FILTERS

The 7272 employs six bandpass filters, one for each of the VHF tuning ranges. Selection of one of the filters is done by setting the frequency range selector switch S701 which passes the output of the selected filter through J801 on the mixer.

4.4 VHF TUNER

The VHF tuner consists of six permeability-tuned Colpitts oscillators, one for each tuning range. They are energized by 10V applied through contacts of S701. The oscillators operate at 52 MHz above the associated tuning frequency to give a 52 MHz IF signal at the mixer.

Oscillator tuning is accomplished by changing the position of the iron cores in L402, L405, L480, L411, L414 and L417. The cores are mounted on a bracket and are moved through the coils by a rack and pinion mechanism. The cores are attached to flexible, threaded shafts, which permit individual adjustment of each core and compensate for any misalignment between the core mounting bracket and the coils.

Each oscillator has three alignment adjustments; trimmers C405, C412, C419, C426, C432 and C438 tune the low-frequency ends of the oscillator ranges; coils L403, L406, L409, L412, L415 and L418 adjust the high-frequency ends; coils L402, L405, L408, L411, L414 and L417 also serve to adjust scale tracking.

The oscillator output signals are coupled through C406, C413, C420, C427, C433 and C439 to a common feed-through on the mixer module. Q801 amplifies oscillator output to insure adequate L.O. drive to the mixer.

4.5 MIXER

The signals from the bandpass filters and the VHF tuner are coupled to a balanced mixer where they beat to give the 52 MHz IF signal. The mixer output is coupled to J802 and from there through J201 to the IF amplifier.

4.6 IF AMPLIFIER

The IF amplifier input signal is applied to a low-pass filter consisting of L201, L202, L203, C201 and C202, which provides input match and attenuates unwanted signals above 52 MHz. From the input circuit the signal is passed through a 52 MHz coaxial resonator filter to the first amplifier stage, employing Q203 in a neutralized, common-emmiter, single-tuned circuit. Neutralization is controlled by trimmer C201; tuning is accomplished through trimmer C211. The amplified signal is coupled to another 52 MHz coaxial resonator filter. It is the bandwidth of these two filters that chiefly determines the bandwidth and adjacent-channel rejection of the IF stages.

The signal from the second filter is amplified by two common-base, single-tuned stages Q202 and Q203. Tuning is accomplished through L204 and L215 respectively. The input level at Q203 is adjusted with potentiometer R238 and the COMP control R210/S201. With the COMP knob pushed in, S201 is open and the control acts with R238 to calibrate the 7272 over its operating

frequency range by adjusting the gain of the IF amplifier at specific frequencies across the range. With the knob pulled out, S201 is closed and the COMP control functions as an uncalibrated gain control. The output of Q203 is coupled to Q205 in the video detector circuit and to Q204 in the discriminator circuit.

4.7 VIDEO DETECTOR

The signal from the IF stages is amplified by Q205 and coupled to the video detector CR201. The detected signal is coupled to J204 and then, through a jumper, to the VIDEO OUTPUT terminal J5. The amplifier stage Q205 is tuned to 52 MHz through L218.

4.8 DISCRIMINATOR

The other portion of the IF signal is amplified by Q204 and coupled to discriminator CR202/CR203 where the FM signals are detected. The amplifier output is tuned through the primary, L216-A, of the discriminator transformer.

The audio signal developed by the discriminator is fed through J205 and P205 to an audio amplifier. The undetected output of Q204 is coupled through C224 to a peak detector.

4.9 AUDIO AMPLIFIER

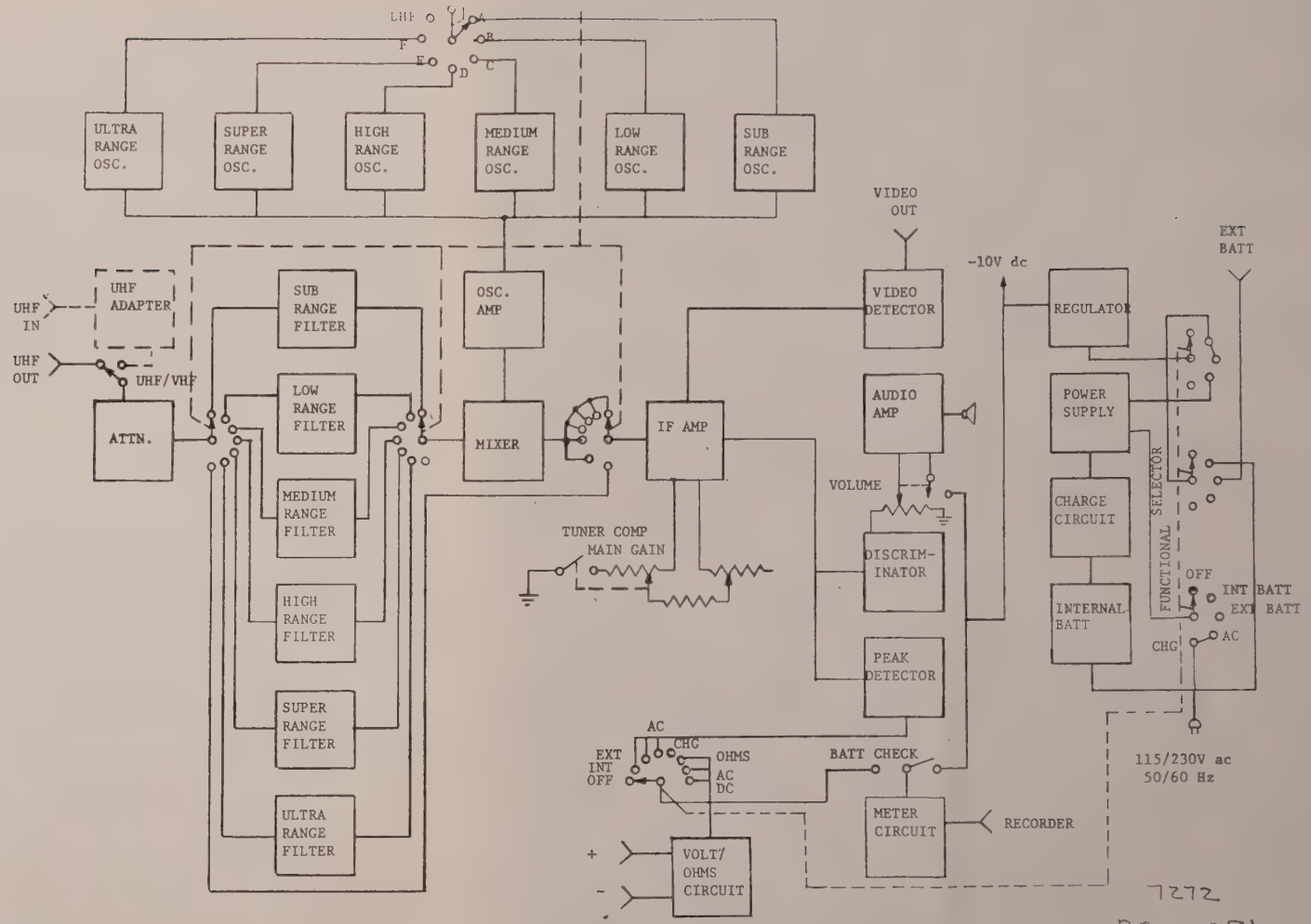
The audio amplifier input signal is applied across VOLUME control R7. The audio signal is passed through an integrated circuit amplifier which drives the panel-mounted speaker. The amplifier is energized through switch S6 mounted on the volume control shaft.

4.10 PEAK DETECTOR

The undetected signal from Q204 is amplified by IC201 and is full wave detected by CR204 and CR205. The detected signal is coupled to IC202 a sample and hold circuit which stores the peak amplitude of the detected waveform. IC207 and Q208 form a high input impedance meter drive curcuit. Potentiometer R234 determines the current through the meter with no input signal and thereby determines meter calibration. R239 sets the gain of IC207 and thereby controls the meter sensitivity to input change. The current through M1 is made available at jack J1 for operation of a recording device.

4.11 POWER SUPPLY

Power for the 7272 may be selected by switch S1 for one of three sources. With S1 in INT BATT position, the negative terminal of the internal battery is connected through the interlock switch S3 and contacts of S1 to the DIAL LIGHTS switch S2 and regulator Q601, Q602 and Q603. Potentiometer R604 in the regulator circuit sets the supply output at 10V. The interlock switch helps to prevent accidental discharge or overcharge of the internal battery when the panel cover is closed.



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REV. F

FUNCTIONAL BLOCK DIAGRAM

In the EXT BATT position, S1 connects the negative terminal of the external battery to S2 and to the regulator. The external battery connections are made at J3 (positive terminal) and J4 (negative terminal) at the rear of the 7272.

With S1 in the AC position, the primary circuit of transformer T1 is complete, and the voltage generated across the secondary is applied to the fullwave rectifier CR601, CR602. The rectified voltage is filtered by C603 and applied through contacts of S1 to the regulator. In addition, the unregulated 18V at the junction of CR601 and CR602 is coupled through CR1, R2 and S3 to the negative terminal of the internal battery to trickle-charge the battery. The AC lamp DS1 indicates that the unit is under power from the AC line. Power selector switch S7 permits operation from a 115V or 230V AC line.

The fourth position of S1, CHG, is provided to permit charging the internal battery. The contacts of S1 apply 18V to the battery through the CHARGE lamp DS2, and through R3 and S3.

MAINTENANCE

5.1 GENERAL

This section contains procedures for minor realignment of the IF section and for recalibrating the instrument. In addition, schematic diagrams are included as aids for the maintenance of the unit.

If for some reason repairs cannot be made in the field, the unit may be returned to Texscan Corporation, Service Department, 2446 North Shadeland Avenue, Indianapolis, Indiana 46219. After notifying Texscan of your intention to return the unit for repair, carefully pack the unit and ship it (with freight and insurance prepaid) together with a note stating the serial number of the unit and listing the difficulties encountered. Repairs will be made free of charge under conditions of the warranty; otherwise nominal charges will be invoiced.

Because alignment of the tuner requires special test fixtures, the procedure for this module is not given here. If the tuner requires realignment or if the IF section becomes grossly misaligned, the 7272 should be returned to Texscan for realignment.

Recalibration should be performed routinely at six-month intervals or when the calibration is suspect. The IF section should be realigned whenever a transistor is replaced.

NOTE: The location of calibration and alignment adjustments and test points is shown in Figures 5-8 and 5-9.

5.2 CALIBRATION

5.2.1 EQUIPMENT REQUIRED

The equipment required to calibrate Model 7272 is listed below. A discussion of the requirements of the equipment follows the list.

1. A RF signal generator
2. A power meter, Hewlett-Packard Model 431A or B, with Model 478A thermistor mount
3. A 6 dB splitter, Jerrold Model 1502
4. One or two 50/75-ohm minimum loss matching pads, such as Texscan Model ZM-57
5. A vacuum-tube voltmeter
6. A 0-15 dB variable attenuator, Texscan Model SA-70

A good quality RF signal generator with a calibrated output attenuator is required for calibrating the 7272. Generators that meet these requirements

include; Texscan VS-60Z, Measurements Model 80, Hewlett-Packard Model 608A, and Boonton Radio Model 202B.

The preferred "power meter" method uses a Hewlett-Packard Model 431A or B power meter with a Model 478A thermistor mount and the 6 dB splitter.

For accurate calibration it is important that the output impedance of the signal generator be 75 ohms. Where an RF signal generator with an output impedance of 50 ohms is used, a 50/75-ohm minimum loss pad must be inserted between the generator and the splitter (Figure 5-2). As the input impedance of the HP power meter is 50 ohms, a similar minimum loss pad is required for the power meter method. Fixed 7.78 dB matching pads may be used in place of the minimum loss pads, bearing in mind that the signal attenuation will differ. (The circuit for a "do-it-your-self" pad is given in Figure5-1). In the calibration procedure, wherever level settings depend on the type of pad employed, the settings for both types are given.

Furthermore, keep in mind that some RF signal generators are calibrated working into an open circuit. When the generator is working into a matched load, the signal level at the load is half the level indicated at the generator (Table 5-1).

5.2.2 SETTING THE REGULATED VOLTAGE LEVEL

1. Open the line cord compartment and remove the cord.
2. Remove the four screws at the rear of the cabinet.
3. Slide the chassis out through the front of the cabinet.
4. Set the power selector switch to INT BATT (be certain that the battery is fully charged).
5. Connect the VTVM between the hot terminal of the VOLUME control and ground. If necessary, adjust R604 on the power supply so that the meter reads 9.9 to 10.0V.
6. Press the BATT CHECK switch and see that the meter needle points to the red BATT mark.

5.2.3 TUNER COMPENSATOR CALIBRATION(POWER METER METHOD)

1. With the 7272 off, set the meter mechanical zero to "0" on the DC volt scale.
2. Power the 7272 from the AC line.
3. Set the power selector switch to AC.
4. Set the UHF/VHF switch to VHF.
5. Set the frequency range switch to UHF.
6. Push the COMP control and turn it to the UHF setting listed on the calibration chart.

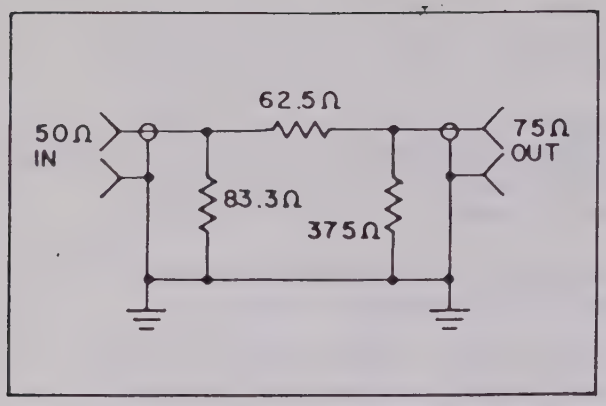


Fig. 5-1. Circuit of 7.78 dB Pad

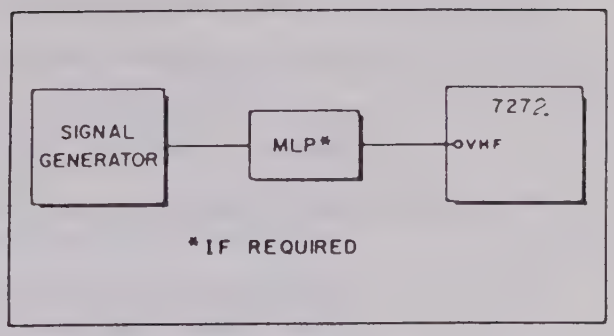


Fig. 5-3 Setup for Tuner Compensator Calibration by the Signal Generator Method

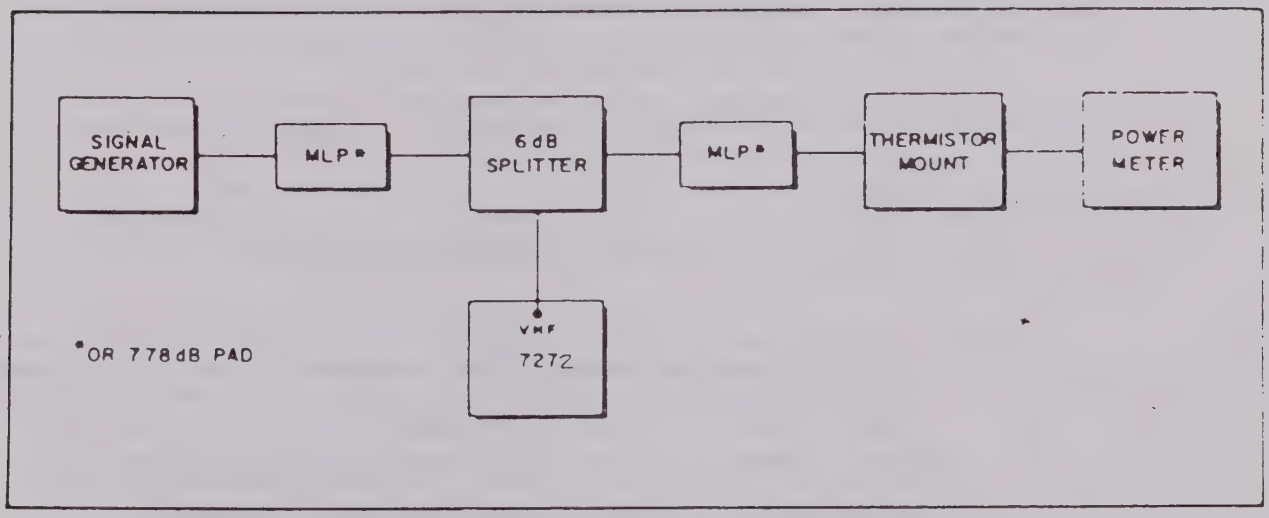


Fig. 5-2. Setup for Tuner Compensator Calibration by the Power Meter Method

TABLE 5-1. SIGNAL GENERATOR OUTPUT LEVELS

727.1 METER RANGE dBmV	GENERATOR OUTPUT*			
	MATCHED 75-OHM	UNMATCHED 75-OHM	MATCHED 50-OHM	UNMATCHED 50-OHM
−20	300 μV	600 μV	600 μV	1200 μV
−10	1000 μV	2000 μV	2000 μV	4000 μV
+10	3000 μV	6000 μV	6000 μV	12 mV
+20	10 mV	20 mV	20 mV	40 mV
+30	30 mV	60 mV	60 mV	120 mV
+40	100 mV	200 mV	200 mV	400 mV
+50	300 mV	600 mV	600 mV	1.2 V
+60	1.0 V	2.0 V	2.0 V	4.0 V
	3.0 V	6.0 V	6.0 V	12.0 V

* 1. If a Model ZM57 (5.7 dB) is used instead of a 7.78 dB pad, the voltage listed for 50 ohm output must be multiplied by 0.735 for the appropriate full scale readings

2. For the UHF position of meter range switch, all tabulated voltages must be multiplied by 0.355. If a model ZM57 (5.7 dB) pad is used instead of a 7.78 pad, all voltages listed for 50 ohm output must be multiplied by 0.279

7. Set the meter range to +40 dBmV.

8. Connect equipment as shown in Figure 5-2.

9. Tune the signal generator to 52 MHz; the 7272 meter should show maximum deflection.

10. Adjust the generator output level to give a power meter reading of 13.43 dBm (15.51 dBm when using 7.78 dB pads).

11. Adjust R238 on the IF chassis for full-scale delfection on the 7272 meter; this adjustment is made with a small screwdriver inserted through the hole in the IF chassis bottom cover.

12. Increase the variable attenuator setting by 10 dB and then 5 dB more, observing that the meter reads forst 0 and then 5 on the dB scale.

13. If the meter reads off these marks, loosen the lock-nut on the zero-adjust control (R234 nearest the front on IF chassis) and adjust it to bring the meter pointer toward these marks.

14. Return the variable attenuator setting to 0 dB and readjust R238 for full scale meter deflection.

15. Repeat Steps 11, 12 and 13 until best agreement is obtained between the meter pointer and the +10, 0 and 5 dB marks; then tighten the lock-nut on R234.

NOTE: In severe cases of misalignment it may be necessary to adjust R239 for proper tracking at 0 on the meter scale. If readings are high at zero decrease the meter deflection with R239 and repeat Steps 10 through 14 as necessary to provide the best possible meter tracking. If the meter reading is low at 0 on the meter scale increase the meter deflection with R239 and repeat Steps 10 through 14 for best meter tracking.

16. Record the COMP control setting next to UHF on the calibration chart.

17. Set the frequency range switch to B.

18. Tune the generator and the 7272 to the center frequency on TV channel 2.

19. Adjust the COMP control for full-scale meter deflection while the power meter reads 4.43 dBm (6.51 dBm if 7.78 pads are used) be certain that the generator is tuned for maximum deflection on the 7272 meter.

At this point repeat Step 11, observing the meter readings. If there is a significant difference between these readings and those first obtained in Step 11, readjust R234 for a compromise setting. Use the COMP control, not R238 for making full-scale adjustments.

If the setting of R234 is changed, it will be necessary to repeat Steps 5 through 10, 16, 17, and 18.

20. Record the COMP control setting next to CH2 on the calibration chart.

21. Repeat Steps 17, 18 and 19, tuning the 7272 and the generator to all of the calibration points in the B, C and D ranges.

22. Set the 7272 frequency range switch to A.

23. If necessary, replace the signal generator with one that will cover this range.

24. Repeat Steps 17, 18 and 19 for all A-range calibration points except 5 MHz.

25. Set the COMP control to the position determined for 10 MHz, and tune the 7272 and the generator to 10 MHz.

26. Calibrate the generator and observe the setting of its attenuator when the 7272 meter reads full scale.

27. Tune the 7272 and the generator to 5 MHZ.

28. Calibrate the generator and adjust its attenuator to the same reading as in Step 25.

29. Adjust the COMP control for full-scale deflection in the 7272 meter.

30. Record the control setting next to 5 MHz on the calibrated chart.

31. Disconnect the line cord from the unit.

32. Return the chassis to the cabinet and fasten it with the four screws.

5.2.4 TUNER COMPENSATOR CALIBRATION (SIGNAL GENERATOR METHOD)

1. With 7272 off, set the meter zero to "0" on the DC volt scale.

2. Power the 7272 from the AC line.

3. Set the power selector switch to AC.

4. Set the UHF/VHF switch to UHF.

5. Set the frequency range switch to UHF.

6. Push in the COMP control and set it to the VHF check point COMP figure on the factory-supplied calibration chart.

7. Set the meter range to +10 dBmV.

8. Connect equipment as shown in Figure 5-3.

9. Tune the signal generator to 52 MHz; the 7272 meter should show maximum deflection.

10. Calibrate the generator and set its output level at 0.355 times the level listed in Table 5-1 for +10 dBmV and the appropriate generator.

11. Adjust R238 on the IF chassis for full-scale deflection on the 7272 meter; this adjustment is made with a small screwdriver inserted through the hole in the IF chassis bottom cover.

12. Increase the variable attenuator setting by 10 dB and then 15 dB more, observing that the meter reads first 0 and then 5 on the dB scale.

13. If the meter reads off these marks, loosen the lock-nut on the zero-adjust control (R234 is nearest the front on IF chassis) and adjust the control to bring the pointer toward these marks.

14. Return the variable attenuator to 0 dB and readjust R238 for full-scale deflection.

15. Repeat Steps 11, 12 and 13 until best agreement is obtained between the meter pointer and the 0 and 5 dB marks; then tighten the lock-nut on R234.

    NOTE: In severe cases of misalignment it may be necessary to adjust R239 for proper tracking at 0 on the meter scale. If readings are high at zero decrease the meter reading slightly with R239 and repeat Steps 10 through 14 as necessary to provide the best possible meter tracking. If the meter reading is low at 0 in the meter scale increase the meter deflection with R239 and repeat Steps 10 theough 14 for best meter tracking.

16. Record the COMP control setting next to UHF on the calibrated chart.

17. Set the frequency range switch to B.

18. Tune the generator and the 7272 to the center frequency of TV channel 2.

19. Calibrate the generator and set its output at the level listed in Table 5-1 for +10 dBmV.

20. Adjust the COMP control for full-scale meter deflection; be certain that the generator is tuned for maximum deflection on the meter.

    At this point, repeat Step 11, observing the meter readings. If thereis a significant difference bewteen these readings and those first obtained in Step 11, readjust R234 for a compromise setting. Use the COMP control, not R238 for making full-scale adjustments.

    If the setting of R234 is changed it will be necessary to repeat Steps 4, 5, 6, 8, 9, 10 and 16 through 19.

21. Record the COMP control setting next to CH2 on the calibration chart.

22. Repeat Steps 17 through 20, tuning the generator and the 7272 to all of the calibration points in the B, C, D, E and F ranges.

23. Set the frequency range switch to A.

24. If necessary, replace the signal generator with one that will cover this range.

25. Repeat Steps 17 through 20 for all A-range calibration points.

26. Disconnect the line cord from the unit.

27. Return the chassis to the cabinet and fasten it with four screws.

5.3 IF SECTION ALIGNMENT

5.3.1 GENERAL

The need for realigning the IF amplifier is indicated when, in attempting to calibrate the unit, it is noted that the COMP settings have moved appreciably toward the high end of the control range. Complete realignment of the IF amplifier requires test equipment not normally available in the field.

For this reason, if the section is grossly misaligned, the unit should be returned to Texscan for realignment. However, it is possible to perform minor realignment (or to determine if factory realignment is necessary) with satisfactory results by using relatively common items of test equipemnt. The procedure for this realignment is described below.

Note that two procedures for aligning the discriminator are also described. The first (sweep generator) method is the preferred one. After aligning the IF amplifier, it will be necessary to align the discriminator and then calibrate the unit.

5.3.2 EQUIPMENT REQUIRED

1. An RF sweep generator, Texscan Model VS-60Z or equivalent.

2. A crystal-calibrated marker generator, RCA Model WR-99A or equivalent.

3. A variable attenuator, Texscan Model SA-70 or equivalent.

4. An oscilloscope.

5.3.3 IF AMPLIFIER ALIGNMENT

1. Open the line cord compartment and remove the cord.

2. Remove the four screws at the rear of the cabinet.

3. Slide the chassis out through the front of the cabinet.

4. Power the 7272 from the AC line.

5. Set the power selector switch to AC.

6. Set the UHF/VHF switch to VHF.

7. Set the frequency range switch to UHF.

8. Set meter range to 0 dBmV.

9. Set up equipment as shown in Figure 5-4; test point number 2 is accessible through a hole in the chassis rear panel near the lower left corner (Figure 5-8).

10. Check that the index mark on the COMP control knob points to 10 when the control is in its maximum clockwise position; if it does not, lossen the setscrew and set the index mark on 10.

11. Push in the COMP control and turn it to the UHF setting listed on the calibration chart.

12. Set the marker and the sweep center frequency at 52 MHz.

13. Set the oscilloscope vertical sensitivity control for maximum gain. Use the variable attenuator for controlling the amplitude of the oscilloscope display.

14. Adjust L214, L215 and C211 for maximum response at 52 MHz (figure 5-5). Use a hexagonal alignment tool similar to General Cement number 8606 for the inductors and a Walsco number 2519 tool for the trimmer.

    NOTE: All adjustments are accessible through holes in the bottom cover of the IF chassis (Figure 5-9).

15. Trimmers C240/C241 and C243/C243 form double-tuned pairs, but the bandwidth of the IF amplifier is so narrow that they too are tuned for maximum response at 52 MHz.

16. If a response similar to that shown in Figure 5-5 cannot be obtaine with the adjustments in Steps 14 and 15, C201, C202, C205, and C214 may be adjusted; however, since these trimmers affect the input match of the amplifier, they should be disturbed only as a last resort. If one or more of these trimmers is obviously misaligned, adjust one at a time, being careful to return the adjustment screw to its original position if no improvement on the response is seen.

5.3.4 VIDEO AMPLIFIER/DETECTOR ALIGNMENT

1. Connect equipment as shown in Figure 5-6.

2. Adjust the amplitude of the oscilloscope display with the variable attenuator, not with the oscilloscope vertical sensitivity control.

3. Adjust L218 for maximum response at 52 MHz.

5.3.5 DISCRIMINATOR ALIGNMENT (SWEEP GENERATOR METHOD)

1. Connect equipment as shown in Figure 5-7.

2. Set the sweep width as narrow as possible so that the generator output

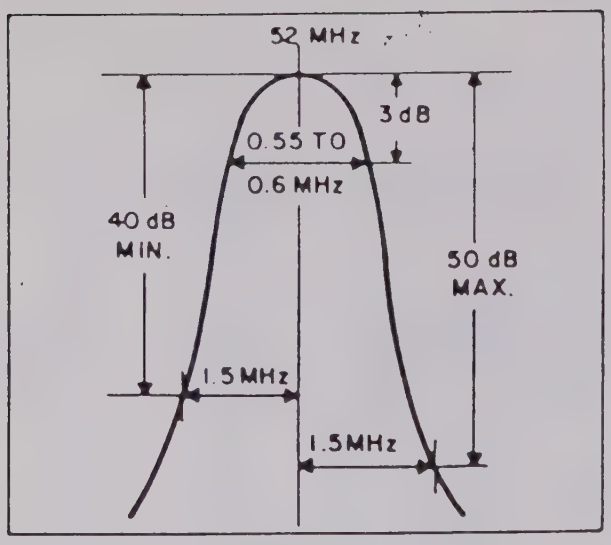


Fig. 5-5. Response of I-F Amplifier at Test Point No. 2

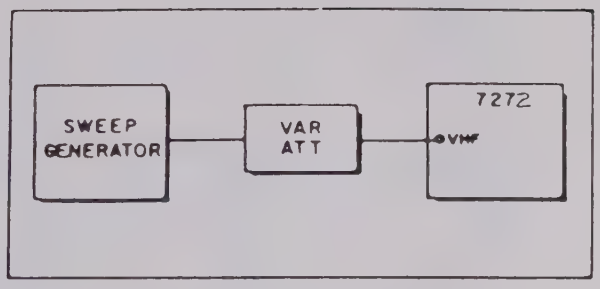


Fig. 5-7. Set up for Discriminator Alignment

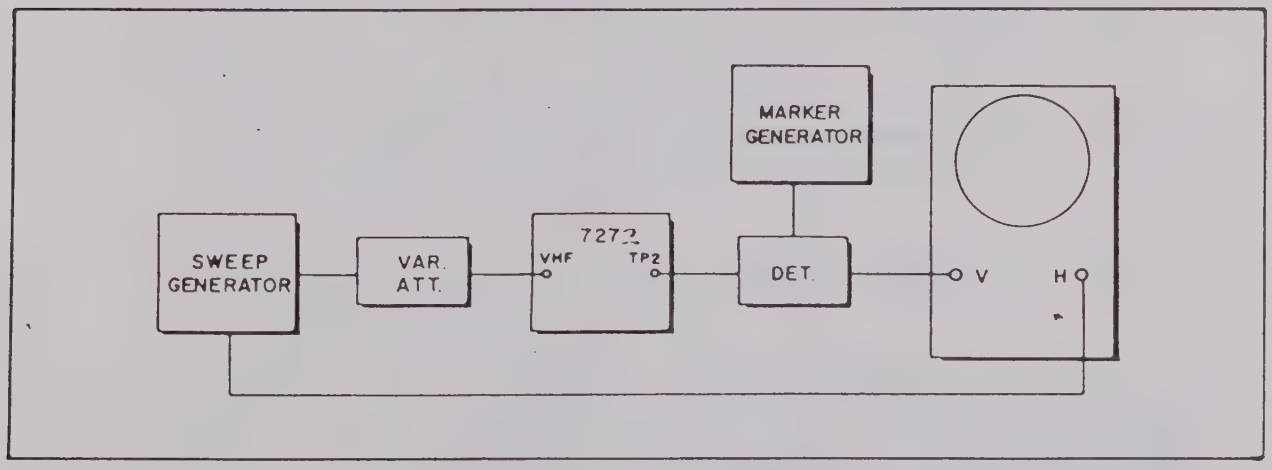


Fig. 5-4. Setup for I-F Amplifier Alignment

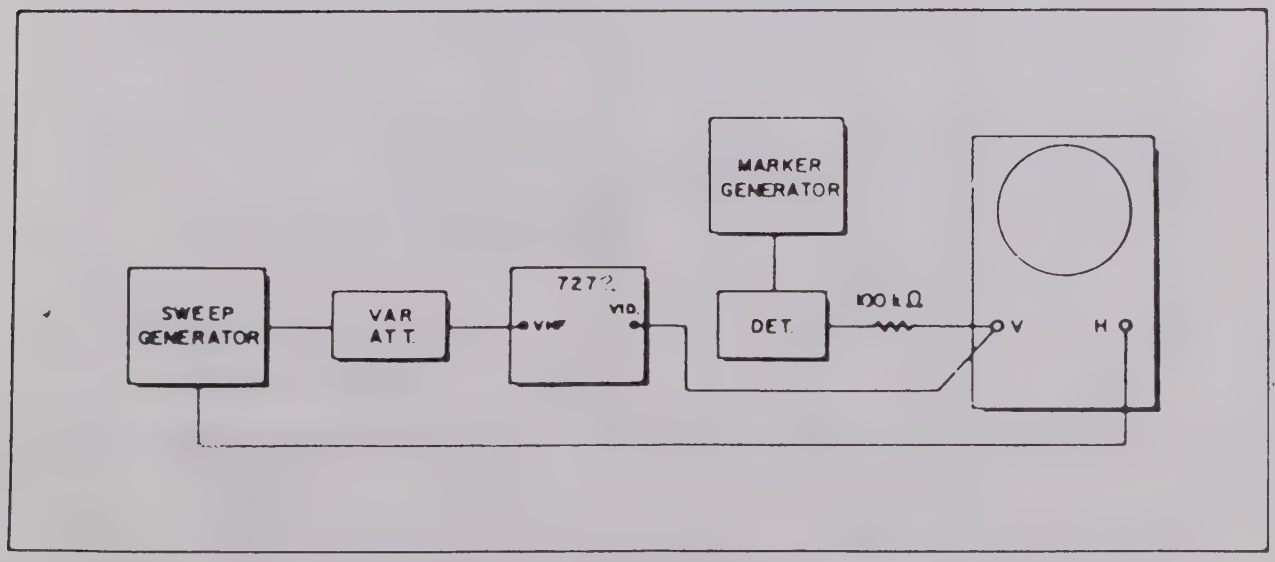


Fig. 5-6. Setup for Video Amplifier/Detector Alignment

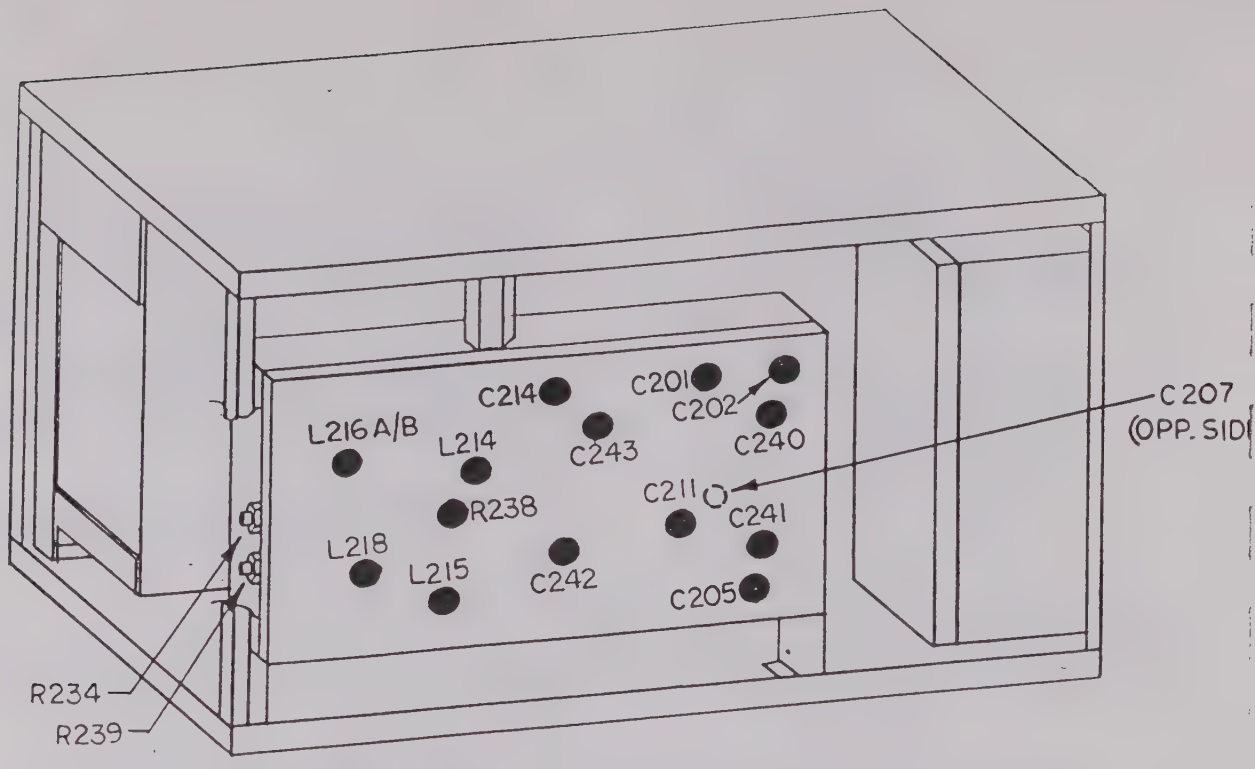


Fig. 5-9. Location of Calibration and Alignment Adjustments on Bottom of I-F Section

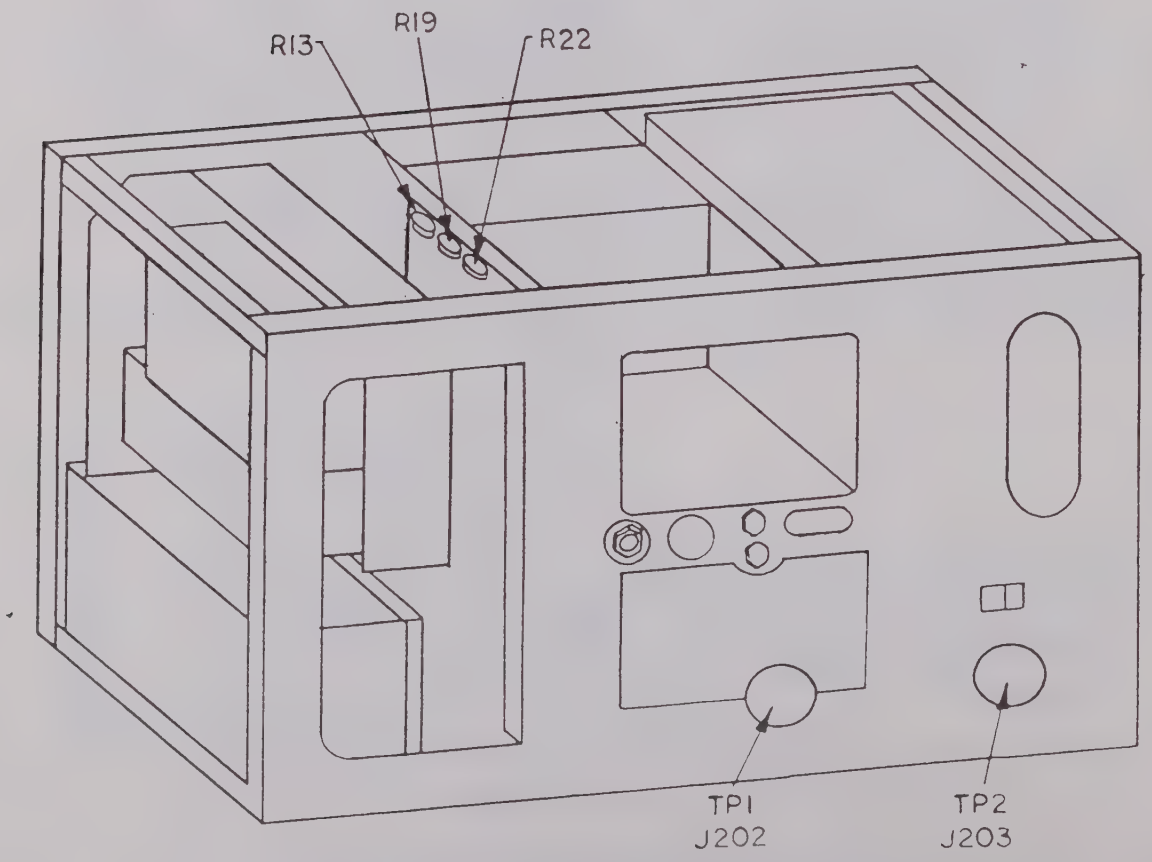


Fig. 5-8. Location of R234, TP1, and TP2

is essentially at one frequency.

3. Set the sweep center frequency at 52 MHz, as indicated by maximum deflection on the 7272 meter.

4. Adjust the variable attenuator for a reading of 4 dB on the 7272 meter.

5. The discriminator coil windings are on opposite ends of a common coil form. The tuning core of the primary winding, L216-A, is positioned toward the chassis hole and the tuning core of the secondary winding, L216-B, is positioned in the top of the coil form. To adjust L216, use a hexagonal tool that will pass through the core of L216-A.

6. Tune L216-A for maximum indication on the meter, readjusting the variable attenuator as necessary to keep the maximum reading at 4 dB.

7. Tune L216-B to the null point; the point where turning the core in either direction increases the meter deflection.

5.3.6 DISCRIMINATOR ALIGNMENT (AIR-SIGNAL METHOD)

1. If a steady television signal is available it can be used for aligning the discriminator. Apply the signal through the variable attenuator to the VHF INPUT terminal on the 7272.

2. Tune the 7272 to a carrier (video or sound) of the signal and adjust the variable attenuator for a 4 dB reading on the meter.

3. Switch on the 7272 audio amplifier.

4. The discriminator coil windings are on opposite ends of a common coil form. The tuning core of the primary winding, L216-A, is positioned toward the chassis hole and the tuning core of the secondary winding, L216-B, is positioned in the tip of the coil form. To adjust L216, use a hexagonal tool that will pass through the core of L216-A.

5. Tune L216-A for maximum indication on the meter, readjusting the variable attenuator as necessary to keep the maximum reading at 4 dB.

6. Tune L216-B to the null point; the point where turning the core in either direction increases the meter deflection. This should correspond to the point where minimum sync buzz is heard, when a video carrier is the signal source, or where best quality sound is heard, when a sound carrier is the signal source.

5.4 VOLT-OHM CALIBRATION

5.4.1 OHMS CALIBRATION

1. Remove the 7272 from the case by removing the four screws in the rear of the case.

2. With the 7272 off, set the meter zero to "0" on the DC volt scale.

3. Make certain that the 7272 internal battery is fully charged.

4. Check the meter fuse and replace if necessary with 1/4A Fast BLO.

5. Connect the red and black test leads to the front panel tip jacks.

6. Set the function switch to OHMS position.

7. Short the test leads together and set R13 the ohms zero. Adjust for a zero reading on the ohms scale.

5.4.2 AC VOLTAGE CALIBRATION

1. Remove the 7272 from the case by removing the four screws in the rear of the case.

2. With the 7272 off, set the meter zero to "0" on the DC volt scale.

3. Connect the red and black test leads to the front panel tip jacks.

4. Check the meter fuse and if necessary replace with a 1/4A Fast BLO.

5. Set the function switch to AC volts position.

6. Apply a known AC voltage to the test leads.

7. Adjust R19 the AC Calibration Pot to achieve an accurate reading on the 7272 AC volt scale.

5.4.3 DC VOLTAGE CALIBRATION

1. Remove the 7272 from the case by removing the four screws in the rear panel.

2. With the 7272 off, set the meter zero to "0" on the DC volts scale.

3. Connect the red and black test leads to the front panel tip jacks.

4. Check the meter fuse and if necessary replace with a 1/4A SLO BLO.

5. Set the function switch to the DC volt position.

6. Apply a known DC voltage to the test leads.

7. Adjust R22, theDC Calibration Pot for a correct reading on the DC volts scale.

REPLACEMENT PARTS LIST

NOTE:

Parts are arranged alphabetically by circuit reference and numerically by increasing part value.

REPLACEMENT PARTS LIST

Circuit Ref. No.	Description	Texscan P/N
B1	Battery, 12V, .600 AH	009-005
	Capacitor, Fixed	
C225	1 pf	012-330
C102	1.2 pf	012-314
C244	5 pf	012-324
C231	10 pf	012-325
C226	15 pf	012-326
C805	47 pf	012-450
C241	100 pf	012-068
C227	100 pf	012-333
C755, C756, C757, C758	1000 pf F.T.	012-001
C763, C802	1000 pf F.T.	012-001
C206, C215, C218, C221	1000 pf	012-009
C222, C224, C228, C239	1000 pf	012-009
C240, C305, C804	1000 pf	012-009
C1, C2	1000 pf	012-332
C245	.004 µf	012-329
C604	.005 µf	012-310
C101, C601, C602	.01 µf	012-005
C234, C235, C236	.01 µf	012-050
C238, C243	.01 µf	012-050
C208, C209, C210, C216	.02 µf	012-309
C217, C219, C220, C223	.02 µf	012-309
C229, C230, C232, C240	.02 µf	012-309
C241, C301	.02 µf	012-309
C302	.1 µf	012-268
C801, C803, C806	.1 µf	012-454
C237, C242	10 µf @ 25V	012-276
C605	30 µf @ 40V	012-064
C303, C304	100 µf @ 16V	012-060
C6	100 µf @ 40V	012-016
C603	220 µf @ 25V	012-312
C3, C4	330 µf @ 16V	012-323
	Capacitor, Variable	
C207	.35 - 1.37 pf	015-029
C211	.7 - 3 pf	015-032
C201, C202	4 - 12 pf	015-031
C205, C214	9 - 50 pf	015-030
	Diodes	
CR201, CR202, CR203	IN34	025-095
CR1, CR2, CR3, CR4	IN4006	025-044
CR5, CR601, CR602, CR604	IN4006	025-044
CR603	IN711	025-093
CR204, CR205	IN82A	025-002
CR206, CR207, CR209	IN914	025-084

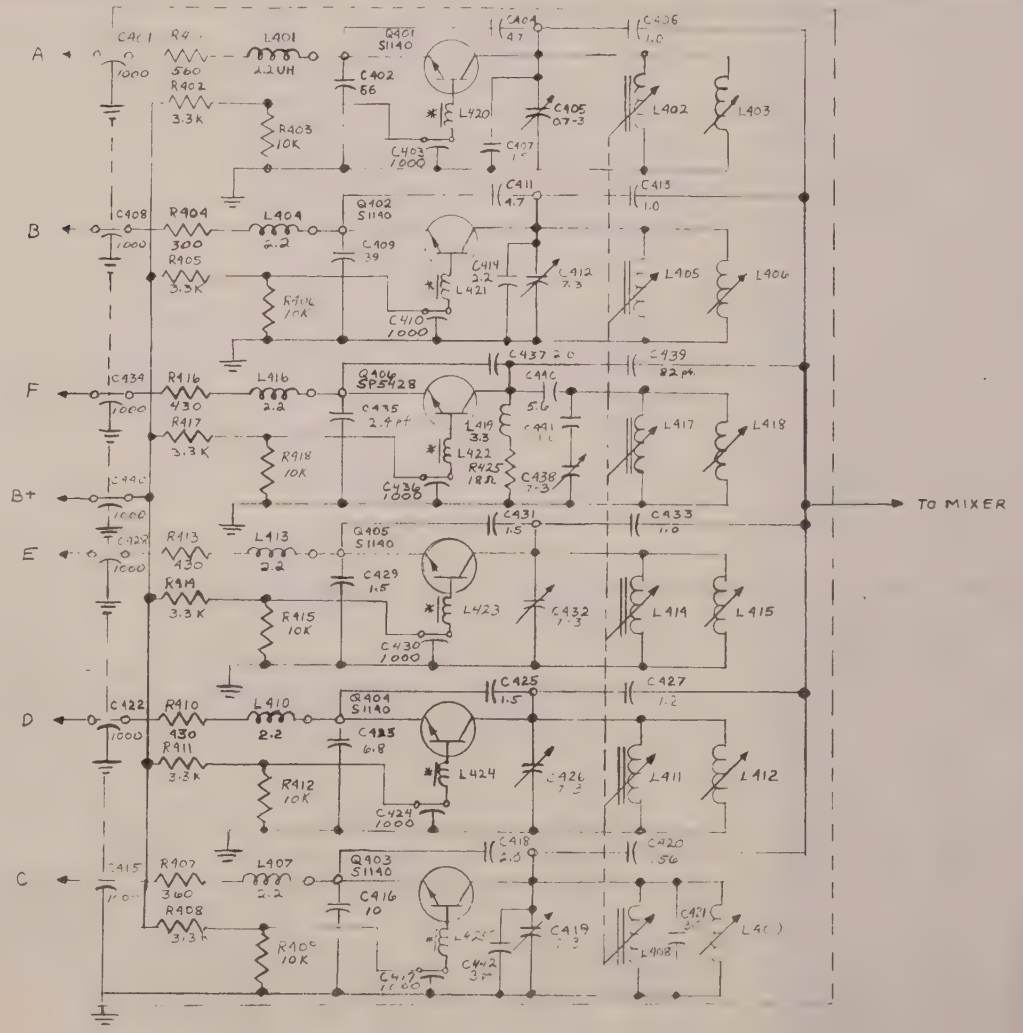
Circuit Ref. No.	Description	Texscan P/N
	Bulbs	
DS1	NE-2H	011-009
DS2	6.3V .039A Amber	011-008
DS3, DS4	T3 1/4	011-002
	Fuse	
F2	1/4A Fast-Blo 3AG	034-005
F1	1/2A Fast-Blo 3AG	034-006
	Integrated Circuits	
IC202	LM311	076-043
IC301	LM337	076-105
IC201	733	076-105
IC203	741C	076-002
	Jack Conncetors	
J1	Phone Jack	054-039
J3, J10	Red, Pin	054-038
J4, J11	Black, Pin	054-037
J5, J101, J202, J203	"F" Connectors	020-208
J103, J201, J204	Sub Min	020-208
J801, J802	Sub Min	020-208
	Inductors	
L201, L203	1.2 µh	035-094
L801	3.3 µh	035-078
L202	5.6 µh	035-093
L219	56 µh	035-095
L222, L223, L224	100 µh	035-041
M1	Meter, 0-200 µa	043-014
	Plug Connectors	
P1	Line Cord	019-104
P103, P104, P105, P704	AMP 27-19	020-206
P205	4 Pin	020-227
	Transistors	
Q208	2N3404	062-083
Q602, Q603	2N3905	062-096
Q601	2N456A	062-097
Q201	36479	062-095
Q202, Q203, A204, Q205	S1140	062-093
Q801	NE 57835	062-158
	Resistors, Fixed	
R806	10Ω, 1/8w, 5%	045-326
R11	10Ω, 1/4w, 10%	045-626
R8	18Ω, 1/2w, 5%	046-036
R805	22Ω, 1/8w, 5%	045-340
R205, R211, R216	24Ω, 1/4w, 5%	045-642
R3	33Ω. 1/2w, 5%	046-046
R801	100Ω, 1/8w, 5%	045-368
R223	100Ω, 1/4w, 5%	045-667

Circuit Ref. No.	Description	Texscan P/N
	Resistors, Fixed	
R10	100Ω, 1w, 10%	046-368
R2	180Ω, 1/2w, 5%	046-078
R807	220Ω, 1/8w, 5%	045-382
R226	200Ω, 1/3w, 5%	045-368
R204, R206, R212, R217	330Ω, 1/4w, 5%	045-688
R804	330Ω, 1/8w, 5%	045-389
R245, R247	498Ω, 1/4w, 1%	047-503
R803	560Ω, 1/8w, 5%	045-400
R603	1KΩ, 1/2w, 5%	045-109
R230, R231	1KΩ, 1/4w, 1%	047-503
R203	1.5KΩ, 1/4w, 5%	045-716
R601, R606	1.6KΩ, 1/4w, 5%	045-719
R207, R213, R218, R225	1.8KΩ, 1/4w, 5%	045-720
R233	2KΩ, 1/4w, 1%	047-449
R605	2.2KΩ, 1/2w, 5%	046-123
R222	3.6KΩ, 1/4w, 5%	045-733
R12, R16	3.92KΩ, 1/4w, 1%	047-445
R802	4.7KΩ, 1/8w, 5%	045-438
R14, R15	4.75KΩ, 1/4w, 1%	047-476
R201	5.6KΩ, 1/4w, 5%	045-741
R602	6.8KΩ, 1/2w, 5%	046-144
R202, R208, R214	8.2KΩ, 1/4w, 5%	045-748
R219, R224	8.2KΩ, 1/4w, 5%	045-748
R236, R237, R242, R243	10KΩ, 1/4w, 1%	047-440
R227	10KΩ, 1/4w, 5%	045-751
R232	10KΩ, 1/4w, 10%	045-752
R241	15KΩ, 1/4w, 10%	045-759
R209, R215	16KΩ, 1/4w, 5%	045-761
R246, R238	20KΩ, 1/4w, 1%	047-459
R302	22KΩ, 1/4w, 10%	045-766
R240	22.1KΩ, 1/4w, 1%	047-443
R1	33KΩ, 1/2w, 5%	046-173
R20	68.1KΩ, 1/4w, 1%	047-446
R6	71.5KΩ, 1/4w, 1%	047-555
R220, R221	100KΩ, 1/4w, 5%	045-793
R18	200KΩ, 1/4w, 1%	047-477
R21	221KΩ, 1/4w, 1%	047-448
R31	330KΩ, 1/4w, 10%	045-815
R5	510KΩ, 1/2w, 5%	046-224
R17	1 MEGΩ, 1/4w, 1%	047-463
R235, R301, R303	1 MEGΩ, 1/4w, 10%	045-836
	Resistor, Variable	
R201, R210	400Ω	048-213-01
R238	500Ω	048-214
R604	1KΩ	048-217
R13	2KΩ	048-183
R234, R239	10KΩ	048-215
R19, R22	20KΩ	048-207
R7	100KΩ w/SPST	048-216

WARRANTY

Texscan Corporation warrants that each part of this product (except vacuum tubes and batteries) will be free from defects in material and workmanship under normal use and service. Texscan Corporation's obligation under this warranty shall be limited to repairing or replacing, F.O.B. Indianapolis, Indiana, each part of the product (except vacuum tubes and batteries) which is defective, provided that buyer gives Texscan written notice of such defect within a period of one year commencing with the delivery of the product by Texscan Corporation. The remedy set forth herein shall be the only remedy available to the buyer for breach of this warranty, and in no event shall Texscan Corporation be liable for incidental or consequential damages for such breach. This warranty shall not apply to any part of the product which, without fault of Texscan Corporation, has been subject to alteration, failure caused by a part not supplied by Texscan Corporation, accident, fire or other casualty, negligence or misuse, or to any part rather than as a result of defect.

Except for warranties set forth above, and the warranties, if any available to the buyer from the persons who supply Texscan Corporation any vacuum tubes or batteries contained in the product, there are no warranties, expressed or implied (including, without implied limitaion, any implied warranties of merchantability or fitness), with respect to the condition of the product or their suitability for the use intended for them by the buyer or by a purchaser from the buyer.



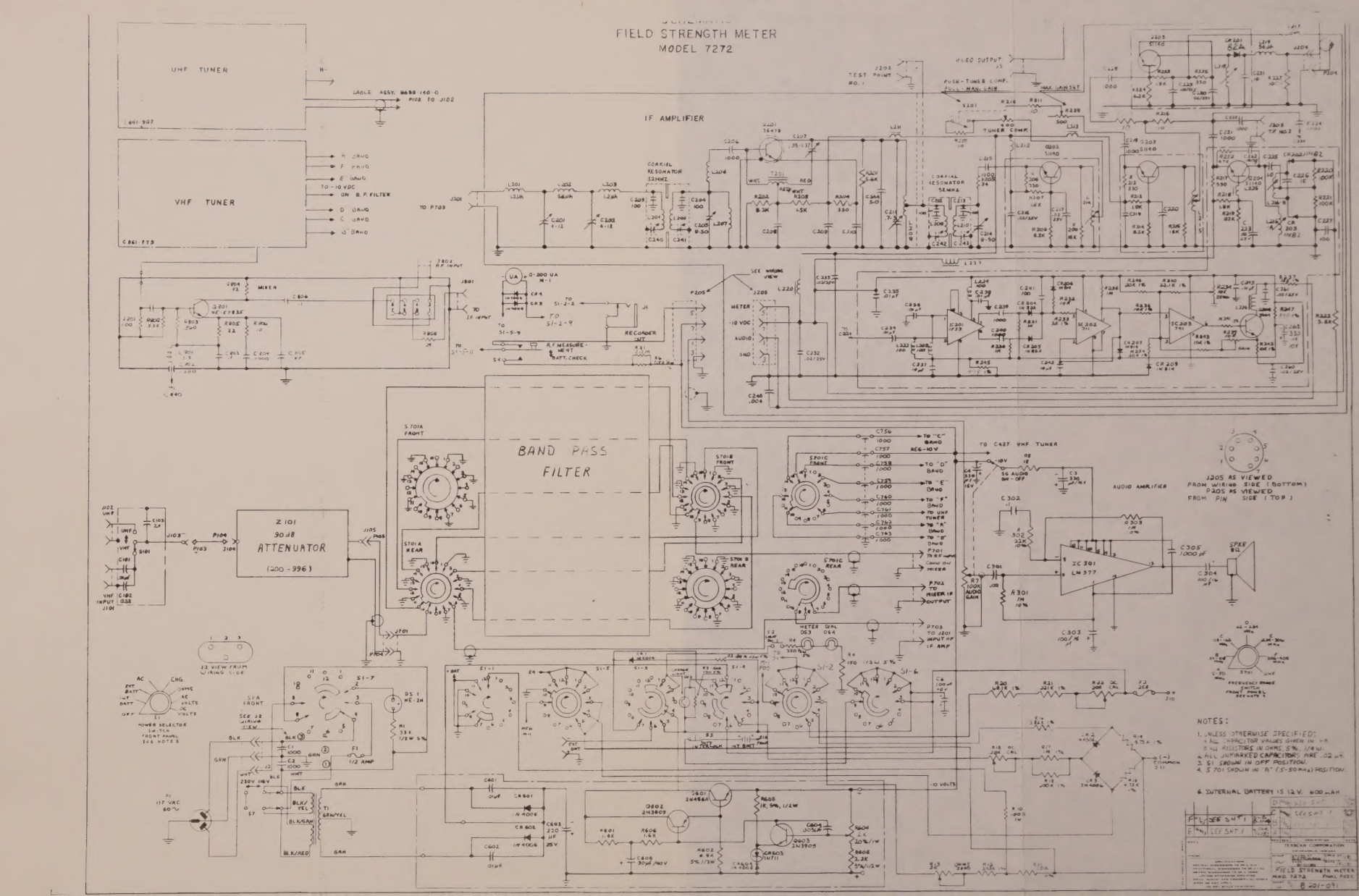
F	7705		1
E			
D		SEE SHEET 1	
C			
B	5034	SEE SHEET 1	
A		SEE SHEET 1	

NEXT ASSEMBLY

SPECIFICATION
DECIMAL DIMENSIONS TO BE ± .015
FRACTIONAL DIMENSIONS TO BE ± 1/64
METRIC DIMENSIONS TO BE ± .4MM
UNLESS OTHERWISE SPECIFIED
DRILL, PUNCH AND COMMERCIAL STOCK
SIZE DO NOT SCALE
DO NOT CUT TO FIT

D. EYCHISON
5-7-80

SCHEMATIC
7272 VHF TUNER
6 B201-091


FIELD STRENGTH METER
MODEL 7272
UHF TUNER
VHF TUNER
IF AMPLIFIER
BAND PASS FILTER
Z 101
90 dB
ATTENUATOR
(200 - 996)
AUDIO AMPLIFIER
IC 301
LM 377
NOTES:
1. UNLESS OTHERWISE SPECIFIED:
a ALL CAPACITOR VALUES GIVEN IN μF
b ALL RESISTORS IN OHMS, 5%, 1/4 W.
c ALL UNMARKED CAPACITORS ARE .02 μF.
3. S1 SHOWN IN OFF POSITION.
4. S 701 SHOWN IN "A" (5-50 MHz) POSITION.
6. INTERNAL BATTERY IS 12 V. 600 mAH
FIELD STRENGTH METER
MOD. 7272
FINAL REV.
B 201-091